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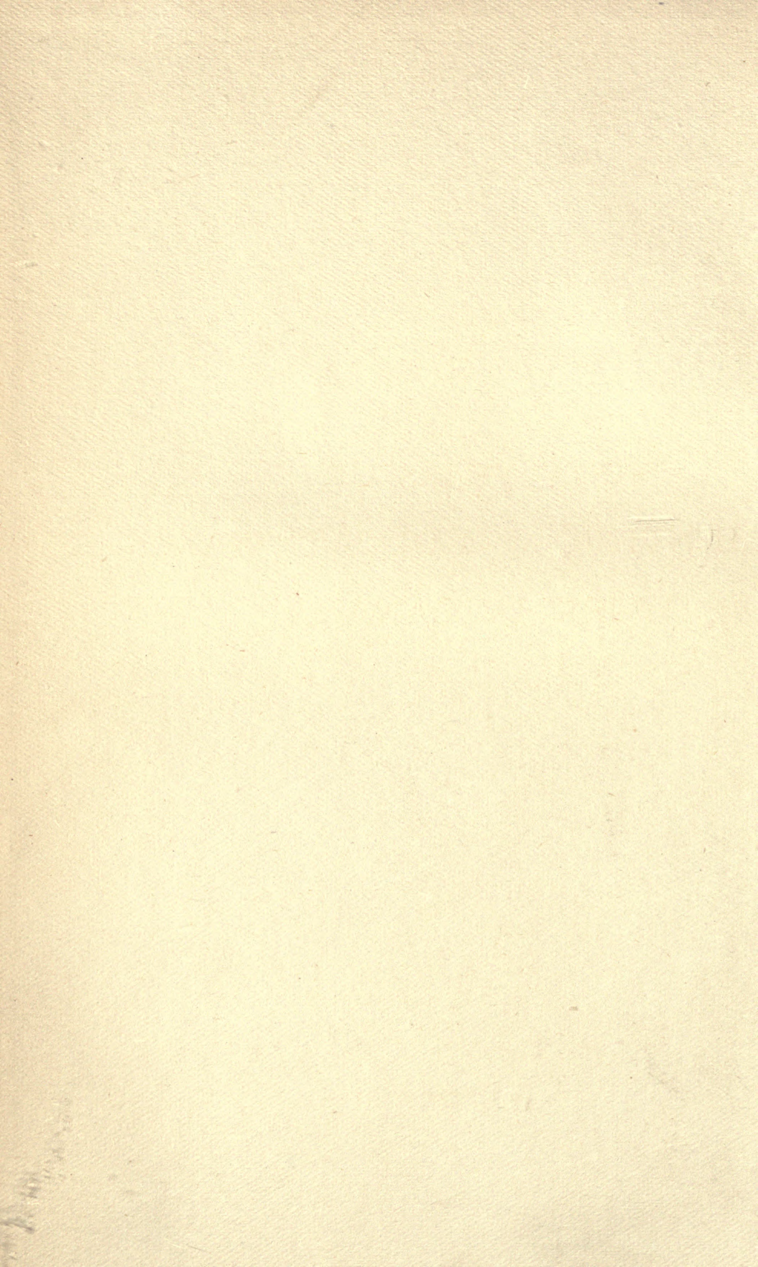

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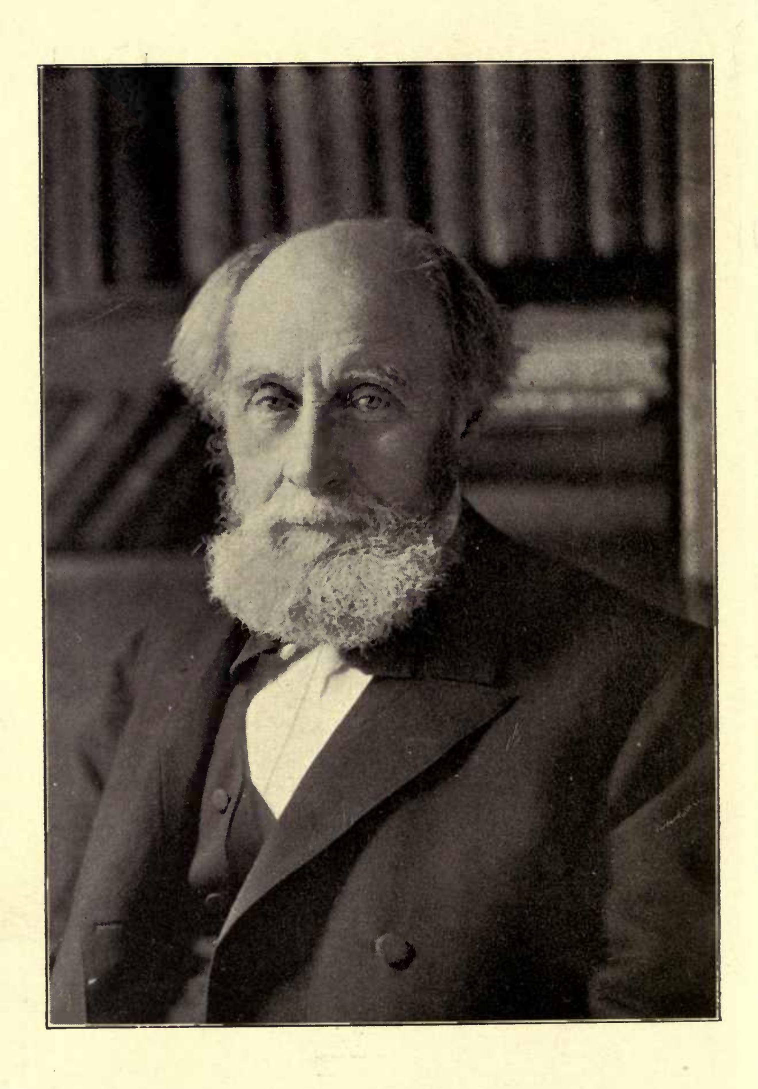


FIFTY YEARS OF SCIENTIFIC & EDUCATIONAL WORK IN CANADA

"O God, Thou hast taught me from my youth, and hitherto have I declared Thy wondrous works."

—PSA. lxxi. 17.





FIFTY YEARS OF WORK IN CANADA

SCIENTIFIC AND EDUCATIONAL

BEING AUTOBIOGRAPHICAL NOTES BY

SIR WILLIAM DAWSON, C.M.G., LL.D., F.R.S.

ETC. ETC.

LATE PRINCIPAL McGILL UNIVERSITY, MONTREAL

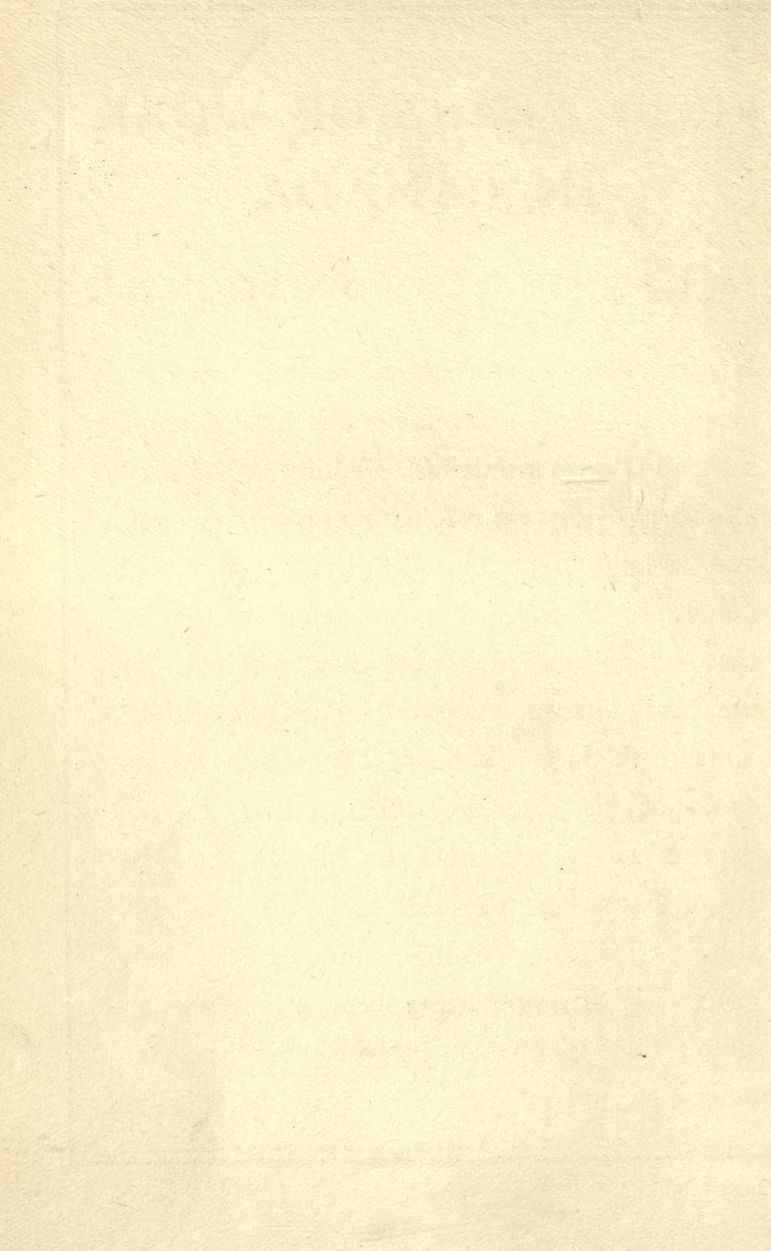
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1901



PREFATORY NOTE

No introduction is required to the "autobiographical notes," comprising this little volume, nor will one be attempted. Whilst it has been a labour of love to us, his sons, to read over, and arrange, the somewhat hastily compiled notes left by our father, we desire neither to take credit, nor to assume responsibility, for the result,—as now placed before the public. This book, is Sir William Dawson's own account of his life and work, and is, by his express wish, presented in his own words. From beginning to end, it is his, and his alone! That it does not claim to be a biography, in any proper sense, it is needless to state; nor, is it necessary to apologise, for omissions, and lack of continuity. It was never

intended to be more than rough jottings, of such events and periods in his life, as remained, after the lapse of years, most firmly and vividly impressed on his own mind.

To myself, personally, the editing of this little book has been a duty, as well as a pleasure, since I undertook, at my father's request, to see that it was put into the form he desired, at as early a date as circumstances might permit.

R. D.

1136 SHERBROOKE STREET,
MONTREAL, *December* 1900.

AUTHOR'S PREFACE

It has been truly said, that the story of any human being, has its lessons either of encouragement or of warning. I make no apology therefore for preparing the sketches that follow,—more especially as many of them refer to persons and events of much more importance than what pertains to myself individually.

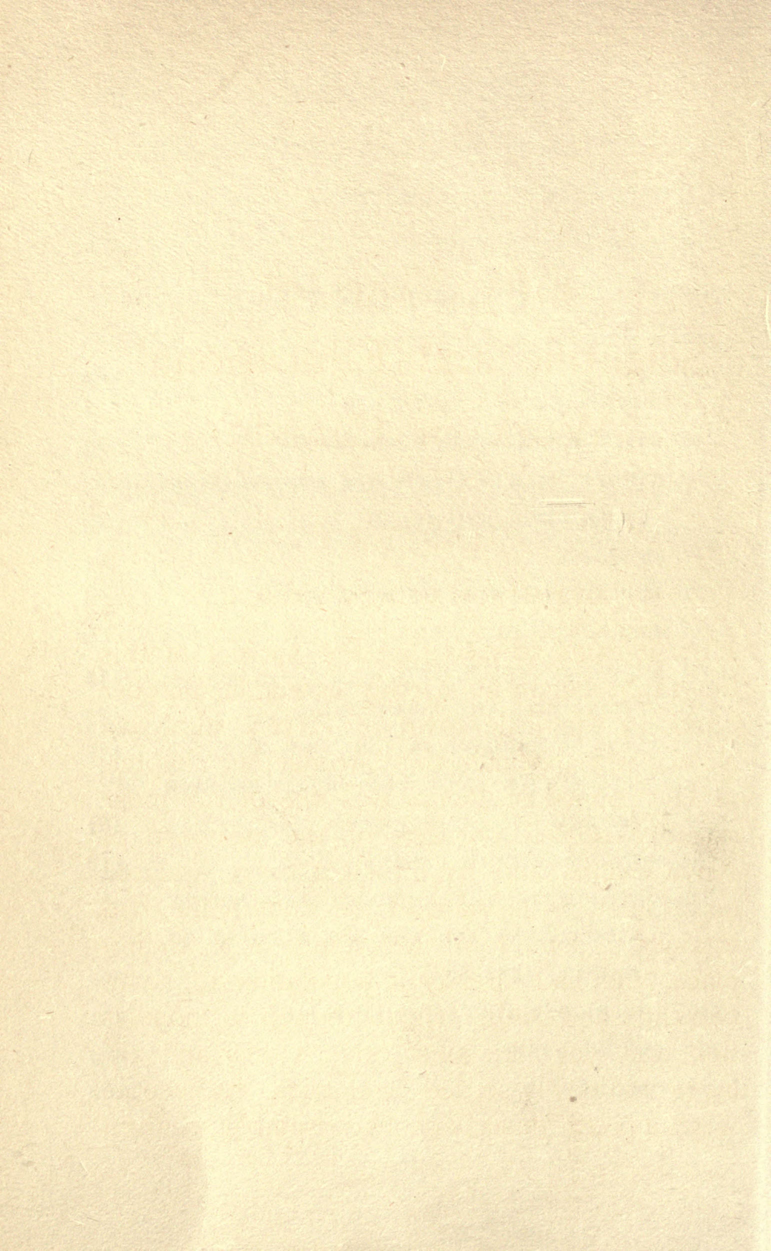
They will, in any case, I trust, be of some use to my children and grand-children, and perhaps to others who may have been influenced by my teaching. To me, they are rather a record of failure, or of very partial success, and I may truly say that the failures are my own, the successes due to the guidance of my Heavenly Father, and to His over-ruling Providence.

I may add here, that, in so far as I have had any success as a teacher of Natural Science, it has been due to my reverend regard for every natural object, as the handiwork of the Divine Creator, and as consequently a sacred thing, the description or illustration of which was to supersede altogether any consideration of personal display or reputation. This is, I believe, the true secret of any power to influence young people, whether with regard to natural objects or as to higher things. Whether the object referred to, be the scale of a moth's wing, or the structure of a mountain, it has, for the time being, to be regarded as the work of God, and therefore transcendently above either the speaker or the hearer.

J. W. D.

LITTLE MÉTIS,
July 1898.

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Fifty Years of Scientific and Educational Work in Canada

CHAPTER I

BIRTHPLACE AND PARENTAGE

How it came to pass that the subject of this biography began his earthly career in October 1820, in the little town of Pictou, in Nova Scotia, will appear in this introductory chapter.

The county of Pictou was one of the more recently settled portions of the province of Nova Scotia, and its principal town, situated on an inlet, or harbour, of the same name, had attained to some local importance as a trading place, and had already a population of about two thousand souls. Small though its population was, yet, like most other towns and villages in newly-settled countries, its people were a very miscellaneous assemblage from

various places, having various kinds of previous training and social position, yet here nearly all reduced to one common social level.

The shores of the pretty landlocked inlet of Pictou harbour—a lake-like expanse, receiving the waters of three small rivers, and surrounded by a country rich in agricultural and mineral resources—were originally occupied by a tribe of Micmac Indians. The place was, no doubt, visited by early French explorers, but they seem to have been unaware of its special resources, and have left no traces of occupation except a few graves by the waterside, and a rudimentary Roman Catholicism implanted in the minds of the natives.

It was first colonised, toward the end of the last century, by a handful of immigrants from the United States,—then British Colonies. They were of Scottish descent, Presbyterian in religion, and mostly from Maryland; in character and previous American training they were well fitted to occupy a new country. With them, or shortly after, came a few negroes, still held in slavery, but soon emancipated. The next important band of settlers consisted of Loyalists, who had served on the royal side in the American War of Independence, and who, when driven from their own

country, were given grants of land in Nova Scotia. Tradition represents them to have been somewhat wild, dissipated, and irreligious, though with some better elements intermixed.

Subsequently, there came in larger numbers Scottish Highlanders, dispossessed in the "clearings" of estates in the north and west of Scotland, or sufficiently adventurous, spontaneously, to seek new homes; a sprinkling from the "Irish exodus;" and, when coal-mines were opened up, Scottish and English miners. To this substratum of mixed peoples were added various individual personages—English, Scottish, and American—traders, professional men, and others, drifted from older districts or from the Mother Country;—people who had seen better days, and who brought with them the remains of early culture, or perhaps the dregs of bad habits which had ruined them elsewhere. There were thus persons of good education and of reputable antecedents, mingled with all sorts of waifs and strays, down to the negro, recently emancipated, or to the poor Micmac, deprived of his lands and degraded into a gipsy and beggar. In such a society there is sure to be a large proportion of odd, eccentric, and misplaced people; and it

is the rule, rather than the exception, that men and women are forced to turn their hands to anything, and to occupy positions, and to do work, the most foreign to their early associations and training.

To a thoughtful boy growing up in such a community, the world, of which he judges from what he sees around him, seems a strange jumble, and according to his tastes or tendencies, and to the home influences acting on him, he may be lowered to the companionship of very worthless associates, or may have his ambition stimulated to aim at higher things. In any case, he is likely to have a wide range of experiences and associations, and to acquire adaptability to varied pursuits, as well as that adventurous spirit which leads to new enterprises. Hence I can recall many companions of my youth who have wandered far from their early homes, some of them to occupy honourable and useful places, others to fail hopelessly.

My parents were Scottish, but from different parts of Scotland, and reared under different influences and surroundings; they met each other owing to the accident of both migrating from their native land, and finding a new home in the same little colonial town.

My father's people were agriculturists in the north of Scotland, connected with an old family, the Dawsons of Crombie, but being descended from a younger branch, were themselves of the class of well-to-do tenant farmers. The tradition was, that the family originated with an Irish officer, who had come over in the interests of James the Second, and who, when the effort to excite a rising in favour of the exiled king had failed, consoled himself by marrying a Scottish maiden dowered with some landed property. He was a Roman Catholic, and the family continued for some generations to adhere to the old faith, and to Jacobite politics. My grandfather was said to have been present, as a stripling, on the side of the Pretender at Culloden Moor, but having escaped that dangerous day, afterwards married a Protestant wife, and in his later days went over to her religion; and their children were educated as Presbyterians. He was noted for his stature and strength, lived to a great age, and was regarded in his parish as a man of vigorous intellect, strong good sense, and sterling integrity. He acted as a burleyman, or appraiser of grain, in his parish, and was often consulted as an arbitrator in differences arising amongst his neighbours. His wife was an

eminently pious woman, earnest in the careful training of her children. Her maiden name was Mitchell, and she was a daughter of the Laird of Frendeaght, in Aberdeenshire.

My father, James Dawson, was a younger son, and spent his earlier years on the paternal farm, and at the parish school. The oldest son was to continue on the farm, another received a more liberal education, fitting him for the legal profession, but my father had to be content to be apprenticed to a tradesman in the neighbouring town of Huntly. Of his experiences in this position, he thus writes, in a manuscript sketch of his life which he prepared in his later years :—

"Some of my apprentice companions were profligate and immoral, and presented such examples of depravity as I had never seen before, but fortunately for me there were others of an opposite character. These were decidedly pious, and though belonging to different communions, they stood firmly by each other as brothers. Two of them were church members, and besides taking part in conducting a Sabbath school, they met once a week, with some others, in the evening for mutual prayer. To these meetings they invited me. They had a number of religious

books at their disposal, and they freely offered me the use of them. They also invited me to attend their several places of worship on the Sabbath evenings, and of this I availed myself, but I attended the parish church in the forenoon. At the age of nineteen, after much serious reflection, I resolved to devote myself to the Lord, and accordingly, having applied to my minister, was admitted to the communion of the church in the summer of 1809."

Having thus taken his stand on the side of Truth, he proceeded to improve his mental culture. He spent his savings on books of a high class, and read them with care. At a time when such views were regarded with much suspicion and disfavour, he became a Liberal in politics, and a dissenter in religion—being repelled from the Established Church by the loose and ungodly lives of some of the clergy of the district. When free from his apprenticeship, his love of independence prompted him to emigrate to the New World.

Thus, at the age of twenty, we find him accepting an offer made by the then leading merchant of Pictou, Nova Scotia. He gives a graphic account of his journey of one hundred and eighty miles, on foot, from Banffshire to

his port of embarkation at Greenock. Sending their principal baggage by carrier, he and three other young men, each with a pack of clothes and provisions, set out on their journey.

"For the sake of making a short cut, we were advised to go by a path which took us through the Grampians, by Kildrummy Castle, and which led in a straight line to Perth. We started on the 8th of March 1811, about midday, from Keith, and at night reached a little town or village called Tomintoul. It stands on the left bank of a rapidly running stream, which we could find no means of crossing, as it was swollen with the melting of the snow in the mountains above. After some search we found a ford, and decided to strip and wade through with our clothes on our heads and shoulders. We succeeded in crossing safely, though it took us breast high, and we had difficulty in resisting the rapidly flowing stream. On arriving in the village we found that none of the people spoke English, but one of our party knew Gaelic sufficiently to make himself understood, and we got a comfortable supper by a peat fire, and slept soundly on heather beds. On this, our first day of Highland travelling, we had passed through some fine scenery, had walked

along the eastern base of Cairngorm, and had picked up and pocketed the best specimens we could find of its famous pebbles.

"We started at daylight up a long valley called Glenavon, down which ran the stream we had crossed the previous evening. Our road was a mere sheep-path, which often led us along the face of precipices so steep and high that it seemed a false step might have plunged us into the stream some hundreds of feet below. When near the head of the glen, at the place where we had to leave it and turn off to the left, we found a hut or shelter, where the sweep of the river formed a piece of level or 'haughland.' The occupants of the hut—a man, his wife, and a boy—were in a field ploughing. The plough was drawn by a cow, with a horse in front of her. The man held the plough, the boy switched the cow, and the woman went ahead beating the horse. These people, however, were very kind to us. The cattle were turned loose, and we were regaled with hot oat cakes, baked on a stone in the ashes, for which they refused any remuneration. Shortly after leaving these hospitable folks we came upon some wild mountain scenery. For some time we had seen before us mountains covered with snow. We now entered amongst

them, and passed through gorges, with here and there great snow banks twenty or thirty feet high. At the greatest height to which we attained we saw, to our left, what seemed an open quarry in the face of a little hill. We turned aside to look at it, and found it to be a thick bed of marl, composed of what we supposed to be sea-shells of many varieties. The people in the low country had found it, and had been carrying it off to manure their fields. It formed a subject of curious conjecture to us how these shells could come to be there, at so great a height above the sea. Early in the afternoon we began to descend the southern slope of the mountains, and to leave the snow behind us, and we soon entered a forest where we saw a herd of deer. We crossed a river on an old bridge near the ruins of Kildrummy Castle, and passed the night at the Spittal of Glenshee amidst beautiful scenery. This day's journey proved too much for me, for I had no sooner entered the house than I fell down in a fainting fit. We were indeed all so much exhausted that we concluded to spend a day here in recruiting."

After undergoing other adventures and hardships, the wayfarers finally reached Greenock in safety, but were detained there some time,

as their ship, though advertised to sail on the 20th of March, was not ready till the 11th of April.

After a voyage of five weeks, they cast anchor in Pictou harbour on May 19, 1811. My father was then twenty-two years of age, and had but the proverbial guinea remaining of the money which he had brought from home. On the expiry of his engagement, he determined to remain in Pictou, and with the aid of his savings, to establish himself in mercantile business on his own account. He fell upon prosperous times, and in five or six years found himself in good circumstances, and with every prospect of accumulating wealth, and of becoming an influential man in the community. He was, indeed, no ordinary man! He was ever influenced by a strong sense of duty, ever a firm believer in divine guidance, ever ready to do good as he had opportunity, and too independent to conceal his opinions, or to cringe to men in place and power. This independence of character in some respects interfered with his advancement, and prevented him from obtaining the public recognition which he merited. For, at that time in the North American colonies, partisanship and subserviency to the bureaucracy of the day, were

essential to political or social progress, and were of more value than merit or ability.

When he married in 1818, he was a merchant and shipowner and at the head of one of the most prosperous businesses in the eastern part of Nova Scotia; but three years after my birth he was, with many others in that part of the world, reduced almost to ruin in the great commercial collapse of 1823–24. Yet he determined to begin life again, to struggle through his difficulties, and to pay all his debts. Throughout my earlier years, therefore, the condition of our household was that of a hard and honest struggle to maintain a respectable appearance, and to repair shattered fortunes. With all this, both he and my mother were willing to make the educational interests of their boys a first charge on their resources. Nor did he relax his activity as a worker in Bible Society, Missionary, Sunday-school, and Temperance enterprises; and ever retained a warm sympathy with the movements in favour of Christian union, peace, free-trade, and the abolition of slavery. In regard to temperance, for example, when I was yet a boy, he read Dr. Lyman Beecher's sermons on intemperance, and in consequence determined to abolish alcoholic beverages from his table, though the

resolution cost him some sacrifices in his social and business relations. He also became active, in the face of much opposition, in establishing a temperance society in the town of Pictou, which I believe was the second in British North America, the first having been begun by the Rev. James Ross, a Presbyterian minister, in a rude district of the county. He had always a strong zeal for education, and was willing to make great sacrifices to secure the best possible advantages for his two sons. My feeling of gratitude for this has only been deepened by the experience of maturer years.

It was a favourite maxim with him that he would rather give us training which no man could take from us, than property, which might be dissipated or lost. At the same time, he impressed us with a respect for honest labour, and taught us to prefer any useful employment to mere amusement. I have said that my early years were, with him, years of contending against misfortune, owing to his reverses in 1824. It was a source of much gratification to me later on that I was able to contribute, out of my earliest earnings, to the removal of the last burdens remaining on his property; and that ultimately, after my removal to Montreal, he was able to retire from business with a

modest competence, and to join us in our new home, where he spent the closing years of his life.

My mother, Mary Rankine, came of a different stock. Her forefathers were small landed proprietors of the "laird" class in Stirlingshire, farming their own land, but associating on equal terms with the neighbouring gentry, and rather despising the trading class of the towns. They were Whigs, and members of the Established Church of Scotland. Whilst my paternal grandfather and his family sided with the Jacobites in the north, my maternal grandfather, when a lad, was nearly captured by the "rebels," when going with his father's servants with a contribution of provisions for General Hawley's army, then in the neighbourhood of Falkirk.

Lonerig, in the parish of Slamannan—my mother's native place—is a ridge of land on the bank of the little river Avon, and the old house and stables still stand, or did so a few years ago, with some modern additions. In my mother's youth there were trees and gardens, since swept away. Her father, who had married somewhat late in life, died when she was young, leaving two children, an only brother and herself. Young Rankine was thus

without paternal guidance, and came into possession of his property at a time when foreign war had inflated trade, and raised the price of agricultural produce, and when extravagant speculations and costly improvements were in vogue, instead of the old-fashioned economy of the small proprietors. When the reaction came he was not in a position to preserve his paternal inheritance. Portions of it had to be sold, and at length the hard necessity pressed upon him of disposing of the whole, and of forsaking the home of his fathers. My mother often referred in later years to her happy girlhood, and to the heartbreaking separation from old friends and dependants when that home had to be broken up. Long afterwards, when I revisited the place, and the tombstones in the kirkyard were the only remaining relics of the family, I found the tradition of William and Mary Rankine still fresh among the older people. Standing on a rising ground, where a turn of the road gives a last view of the old homestead and the ridge on which it is built, I have attempted to realise the feelings which must have wrung hundreds of Scottish hearts transplanted from homes in the motherland to take root in the New World of the West.

William Rankine, still a young and unmar-

ried man, went out into the world alone, leaving his sister to the care and kind hospitality of distant relatives in Edinburgh, and with the little remainder of his means, and a commission as the agent for some wild lands in Nova Scotia, succeeded in a few years in making a new home beyond the sea, to which his sister came. She remained with him until she became my father's wife, a step in which she had but one deep regret, that she had to leave her brother to a loneliness which she feared might not be conducive either to his welfare or to his happiness, and which lent bitterness to her sorrow when he died while yet only in middle life.

I was but a boy at the time of William Rankine's death, but old enough to feel the loss, and to weep with my mother; for "Uncle Rankine" was my dearest friend, always glad to see me, kind and liberal in ministering to my childish whims and desires, and ever willing to play or romp with me. In his youth he had belonged to a corps of yeomanry, raised when a French invasion was dreaded; and in Pictou he became the captain of an artillery company organised to defend our town against American privateers. I have a vivid remembrance of his showing me the sword exercise with a sabre which had belonged to his cavalry outfit, and which flashed

before my astonished eyes with a brightness at once awe-inspiring and delightful. Once, when I fear I must have been a very naughty boy at home, I remember packing my most valued toys in a box, and marching off with the threat that I was going to stay always with Uncle Rankine; but he comforted me, and in due time brought me back, with apologies, to my mother. Dear Uncle Rankine! His was a kind and generous heart—too much so, I fear, to hold his own in the struggle of life. I have no doubt that his hope was to amass enough in the New World to enable him to recover his Scottish patrimony, and he had made some progress towards this, when he was borne down by the calamities which in the years following 1823 told so heavily on my father, and on many others in the maritime provinces.

What shall I say of my mother? What can any man say of a loving mother to the careless world? She was a woman of deep affections and of many sorrows, aggravated by a disposition not too buoyant or hopeful. Her girlish years had been saddened by the death of her parents, and by the mournful breaking up of the old home. Her early married life had been clouded by the financial losses of her

husband, by the loss of her only brother, and later, by the death of the younger of her two boys, a stroke from which she never fully recovered. She was a good woman, but never entered heartily into the new colonial social conditions into which she had been cast, though she had a few warm and attached friends, and was very kind to such of the needy as she could help. The world, to her, was in many respects a vale of tears. She died before my removal from Nova Scotia.

In looking back upon my parents, it is difficult to say to which I owe most of character or influence. I can detect in myself much of the constitution and lineaments of both, and am sometimes disposed to think that I inherit more of their failings than of their virtues. They differed essentially from each other, in temperament and early training, but were one in simple piety, in love for their children, and devotion to the serious duties of life.

To this day, I cannot recall without deep emotion the remembrance of the sacrifices they made, and of the anxieties they incurred to secure for me opportunities of improvement. The memory of such benefits grows in power as we advance in age, and we regret that the time is passed when we could have repaid

them, and that we have in our turn, been so little able to confer similar benefits on our own contemporaries and successors.

I would specially record with gratitude that, at a time when he was in straitened circumstances, my father contributed liberally in aid of educational institutions, then being established in Pictou, with the view of securing their benefits for his sons, and that he and my mother aided and stimulated our early tastes for literature and science. After my brother's death, they were willing to permit an only child to go from home, on excursions more or less dangerous, and to travel abroad, at a time when this was much less safe and speedy than at present,—when, too, their means were not over abundant. Our home, I may add here, was a very quiet one, except when strangers, especially men engaged in missionary and benevolent enterprises, were occasionally invited as guests. To some of these I was indebted for much information and guidance; and, of a few of them, I may say that they were in spiritual things as angels entertained unawares. There was always much work and study in the winter evenings, and I remember with what pleasure I used to listen to my father's reading, chiefly in history and bio-

graphy, for the benefit of my mother, when busy with her needle, as well as of my brother and myself, after our lessons were finished.

There were, as already mentioned, only two of us—my brother James and I. He was cut off, while still a boy, by scarlet fever, which at that time was remarkably prevalent and fatal. He was a fine boy—handsome, cheerful, affable and frank, a favourite with all, and very dear to me; for, though he was some years younger than I, we were constant companions, and as we advanced in age, the difference seemed to become less, especially as he was less diffident than I was. I remember but one incident in my intercourse with him, which I repent of, and which even yet causes a pang when I think of it, though it was sixty years ago. One day, not long before he was seized with the illness which proved fatal to him, he asked me to assist him with a difficult piece of Latin translation. I was busy with some affair of my own, and refused. He went away disappointed, and it was not many weeks later when he was taken from us. Such little acts of unkindness may form bitter drops in the cup of life, even when repented of and forgiven.

My brother's death for a time darkened the world to me. It seemed as if the sunshine

had been blotted out of my life, and I can date from this time my first serious impressions of the realities of life, as distinguished from the merely visible things with which we are chiefly occupied in this world. In all these sixty years my brother, dead to me, lives to God, in that land of eternal realities to which he has gone; whilst I have been striving here below, in this world of appearances and vain shows, often having to contend for the truth, as well as to help the wounded in the battle of life. The two lots are widely separated, but they meet at the last, and there may be blessing in both.

My early home had much in it to foster studies of nature, and both my parents encouraged such pursuits. A somewhat wild garden, with many trees and shrubs, was full of objects of interest; within easy walking distance were rough pastures, with second-growth woods, bogs, and swamps, rich in berries and flowers in their season, and inhabited by a great variety of birds and insects. Nothing pleased my father more than to take an early morning hour, or rare holiday, and wander through such places with his boys, studying and collecting their treasures. The harbour of Pictou, too, with its narrow entrance from

the sea, affords ample opportunities for such investigations, and its waters teem with fish: from the gay striped bass and lordly salmon to the ever-hungry smelt — the delight of juvenile anglers. In such a basin, visited every day by the ocean tides, there is an endless variety of the humbler forms of aquatic life, and along the streams entering it a wealth of curious animals and plants with which an inquisitive boy could easily make himself familiar, in his rambles and occasional angling expeditions. But I now must leave these more domestic matters and youthful incidents and turn to others in which I had to do with the outside world.

CHAPTER II

EARLY EDUCATIONAL EXPERIENCES

Before my birth, Pictou and the neighbouring country had been leavened to a great extent with earnest religious feeling, and purged from the rude ways of its early population of disbanded soldiers, principally through the missionary work of James MacGregor, a Scottish Presbyterian minister who had settled himself in the district while still in its infancy. He was a man of truly apostolic spirit, and gifted with rare energy and ability. He travelled through a wide district, then almost without any means of civilised communication, preached both in the English and Gaelic languages, and had done much to awaken among the people a zeal both for religion and education.

Such men are of inestimable value in recently settled countries. Families removed from old associations and restraints tend to relapse into a sort of heathenism and semi-barbarism, while the children without education, and with no experience other than those of a forest farm,

sink to a lower level than that of their parents, so that a rapid deterioration in mental and spiritual culture is soon apparent. No influence has been found so potent to counteract this downward tendency as that of the missionary preacher, proclaiming the gospel of Christ, advocating a high standard of life, establishing Sabbath schools and religious meetings, distributing the Bible and other useful books, encouraging the people to unite for public schools and similar important undertakings, and bringing them into relation with the religious and intellectual life of more advanced communities. This good work Dr. MacGregor did, in a very eminent degree, for a large district in eastern Nova Scotia. Before I was old enough to know much of such matters he was an aged man, and had retired from his more laborious work, which was in the hands of younger ministers, settled over congregations whose infancy he had cherished.

One of these men, the Rev. Dr. Thomas McCulloch, was destined to exercise great influence on the intellectual life of the district. He had come out from Scotland in 1803 to seek a settlement in America. The story ran that his intention was to go to Prince Edward Island, but that the head of the largest commercial firm

in Pictou—a local magnate of much importance—had his attention drawn to the young minister owing to some electrical apparatus which he had brought with him, and had induced him to remain in Pictou as a teacher and preacher. McCulloch was a man of an acute and vigorous intellect, remarkably versatile in its scope; he was well read in the literature and philosophy of the time, and had given some attention to physical and natural science for which he had strong innate tastes. He was a man of independent character, confident in himself and in his power of leading others, astute in guiding and regulating affairs, and a keen and incisive controversialist. With all this he was a patient teacher, and ready to add to the ordinary curriculum of the academy which he established much practical instruction gathered from his varied studies of nature and of man. In a larger field, with opportunity for original work and fewer distractions, he might have achieved a wide reputation. As it was, he became the founder and principal of one of the most important educational establishments in Nova Scotia, and exercised a large and lasting influence on the intellectual life of that province.

It thus happened that, before I was ready

to commence my education, there was established in Pictou, a grammar school on the plan of the parish schools of Scotland, and a college known as the Pictou Academy, primarily, as in many similar cases, for the training of young men for the Christian ministry. The curriculum of the latter, based on the arts course in Glasgow, where McCulloch had been educated, extended over four years. The college was furnished with a respectable library, philosophical apparatus, and, what was less usual at that time, a collection of natural history, mainly composed of local specimens, collected by the principal and his sons, but including a small set of fossils from some typical localities in Great Britain. It gave no degrees, because, under the narrow system then existing, that power was restricted to a college under the auspices of the Church of England, to whose articles students were expected to subscribe, a restraint not to be borne by stiffnecked Scottish Presbyterians, who, besides, regarded their own college as the better of the two.

My first scholastic training was the work of a woman of a degree of culture and refinement not common, at that time, in our little community. Educated in Scotland, in the subjects then usual in schools for ladies, she had been, I

believe, for a time a governess. Her subsequent married life was of a chequered and not very prosperous character, and, being left a widow in a strange land, she established a small private school. In this, with her quiet lady-like ways, her motherly kindness, and Christian character, together with her elementary teaching, she wielded no small power for good over the little boys and girls committed to her care. I have always retained a loving remembrance of this good woman, have visited her when in Pictou, and have rejoiced to give her the credit of laying the foundation of whatever attainments I have made. She lived to give their earliest lessons to my own two elder children. I may add that by her interest in flowers, and such objects as we collected, as well as by the occasional exhibition of a model of Solomon's Temple of her own making, she cultivated tastes and desires for knowledge beyond the limits of the three R's.

From this quiet little corner I was transferred to the higher arena of the grammar school, intended for boys only, and managed on the good old-fashioned plan of long hours, hard lessons, no prizes, but some punishments; and with the usual amount of roughness among the pupils, aggravated somewhat

by the fact that the reputation of the school attracted to it boys from distant places.

I was a moderately diligent, but, I fancy, not very brilliant pupil, and had throughout the misfortune, from rapid growth in stature, and perhaps also because of having somewhat more than the average amount of intelligence, to be in a class with boys older than myself. Partly, perhaps, from this cause, partly because of my mother's dread lest I should contract bad habits by association with low companions, I did not mix much with my schoolfellows, but generally ran home after school to enter into small pursuits of my own, such as angling, gardening, roaming along the shores and in the woods, or, in bad weather, taking up some book. A little later, when I began to make special collections, in which I was greatly encouraged by my parents, I went in search of shells, fossils, insects, and rare birds.

At this time, I suspect that many hours which should have been given to lessons were devoted to the above pursuits, or to miscellaneous reading, though, perhaps, not more than other boys were devoting to sports and games. We had a circulating library in the town, which abounded in works of fiction, history, travel, and biography. These books I

devoured with avidity, and if they did not bear on daily school work, they at least furnished a fund of general knowledge of value at a later period. In due time I was promoted from the grammar school to the college, and became a student, with a scarlet gown on the pattern of that of Glasgow, and with no little addition to self-importance. New privileges, most congenial to me, in the way of experimental lectures in elementary physics, and access to books and specimens in the college, were now enjoyed. These made the work much more agreeable than that of the school, though, I confess, my happiness was still greatly marred by the necessity of continual grind at classics and mathematics. Even in these, however, there was improvement on the school work, and I derived much pleasure from the historical parts of Greek and Latin literature, as well as from philological subjects; and was delighted to find that mathematics could become of some interest when applied to the problems of physics and astronomy. Somewhat later, I became, by a fortunate purchase at a sale of books, the possessor of a copy of Hadenger's translation of Mohs' Mineralogy, and learned, that the mysteries of solid geometry and trigonometry had been materialised in the crystals

of quartz, calcite, and zeolite, which I had collected from ballast piles on the wharves, or from the quarries and coast cliffs. At this time also, in connection with the chemical lectures, I set up a little laboratory of my own, and met with other students occasionally, for chemical experiments. Natural history had for me, however, greater charms, and as one of our principal's sons was a skilful preparer of birds and insects, and was willing to impart his knowledge to me, I worked for a time at preparing collections of birds, butterflies, and moths, the greater part of which were afterwards destroyed by fire in Montreal. Another employment was drawing, some lessons in which I had obtained from an itinerant teacher of the art. Elocution was now added to my studies, through the agency of a Scottish teacher of this subject, who settled himself for a time in the town, and was wisely encouraged by Dr. McCulloch to form a class in the college. This was my first experience in the value of training the voice for speaking and reading. In connection with this, a local literary and scientific society was formed, in which I took an active part, and before which, in 1836, my first scientific lecture was delivered. It bore the somewhat ambitious

title: "On the Structure and History of the Earth."

Whilst I was still a student (in 1835), my father became the proprietor of a printing establishment, and I had thus an opportunity of learning something of proof-reading, and matters connected with publication, which has not been without use to me in after life. Soon afterwards, in connection with one of my father's publishing ventures, I made a journey to Boston. In those days we travelled by stage-coach from Pictou to Halifax, and the means of communication thence to Boston was by sailing packet. The journey to Halifax occupied two days, and unless the wind was favourable, the voyage from Halifax might extend to a week. This expedition was a memorable one to me, as being my first long absence from home, and my first visit to any large city.

I had introductions to friends of my parents at Halifax, and among these was one to Joseph Howe, afterwards so well known as a political leader, but at that time building up his reputation as the ablest of our newspaper writers. Howe was very kind to me, inviting me to his house and giving me some books to read on the voyage. This was my first intercourse with

a man who worked a revolution in the constitution of his province, and exercised some influence on my own after life. Another family with which I then became acquainted was that of the Youngs,—my mother, on her voyage to Nova Scotia, having been a fellow-passenger with Miss Renny, a sister of Mrs. Young. The Hon. John Young was a leading merchant of Halifax and prominent in political affairs. Miss Renny had married Mr. Thompson, a West Indian gentleman, and her home was for some years in Jamaica, but after his death she had returned to Halifax, with her three sons, the oldest a little younger than myself. Mrs. Young also had three sons—William, afterwards Sir William Young, Chief Justice of Nova Scotia; George, for many years a leading lawyer and public man; and Charles, who was nearer to my own age than his brothers.

A somewhat shy and rustic boy, I was thrown into the society of these young men, considerably my seniors, and much my superiors in some kinds of culture, and in knowledge of the world. They were all very courteous and kind to me, and afterwards we became fast friends. On many subsequent visits to Halifax, Mrs Thompson acted to me with motherly kindness and hospitality.

In Boston I had an introduction to Nathaniel Willis, then the editor of the only paper for children published in America, and a good and kindly man. Through him I saw much that was of interest to me in Boston and Cambridge. At that time there was no indication of the great development of natural science which took place under Agassiz, but the Natural History Society of Boston, then in its old building, had already valuable collections. I was also introduced to Augustus Gould, the eminent conchologist, who afterwards aided me not a little in the study of shells, both recent and ancient. I had previously exchanged specimens with Mr. Taylor of New Bedford, who gave me the names of many new species, and also enabled me to establish the resemblance of the molluscs of Northumberland Strait to those south of Cape Cod, a fact not published till very much later. I visited, too, one of the then famous nursery gardens of the village of Newton, in going to which I, for the first time, travelled by railway.

Some rudimentary excursions and expeditions which went on *pari passu* with my academical education, and occupied me for a short time after its completion, may here be referred to. At the time they were merely recreations

or amusements which might have been for ever laid aside in the interest of more serious pursuits, but which, in my case, had an important influence in determining the current of my life.

Under the town of Pictou, and partially exposed in quarries, road-cuttings, and coast and river cliffs in that vicinity, are beds of shale and sandstone, belonging to the upper members of the carboniferous system, in which, on the banks of the eastern of the three rivers flowing into the harbour, are the great beds of the Pictou coalfields; and these rocks near the town of Pictou often show specimens of fossil plants characteristic of the coal formation.

It happened, when I was a mere schoolboy, that an excavation in a bank not far from the schoolhouse exposed a bed of fine clay-shale, which some of the boys discovered to be available for the manufacture of home-made slate pencils. So we used to amuse ourselves occasionally by digging out flakes of the stone, and cutting them into pencils with our pocket-knives. While engaged in this occupation, I was surprised to find that one of the flakes had on it what seemed to be a delicate tracing in black, of a leaf like that of a fern. I was at the time altogether ignorant of geology and of fossil

plants, but was greatly struck by this unexpected discovery. I can remember, as well as if it were only yesterday, the effect on my mind of this new and mysterious fact, which was the beginning of many similar discoveries that have been among the chief pleasures of my life. Digging farther into the bed, I found more fragments of leaves, and soon had a little collection of them laid out on the shelf of a cupboard in which I kept my childish treasures. But the strangeness of the fact dwelt in my mind, and I was puzzled by the question whether they were real leaves or not, and, if real, how they came to be in the stone. My mother knew that such things were said to be found in the collieries near her old home in Scotland, but she had not given any attention to them, and such literature as I had access to was silent on the subject. My father, at length observing that I dwelt on the matter and had made a considerable collection of specimens, advised me to show some of them to Dr. McCulloch. I was then only a schoolboy, but I ventured, with some trepidation, to seek an interview with the man of learning, taking with me some of my best impressions of leaves. He received me kindly, and assured me that the impressions were real leaves

imbedded in the stone when it was being formed, and showed me some fossil plants of the coal-formation from England, and from Cape Breton, which were in the college collection. He further condescended to accept a few of my specimens, for the college cabinet, and encouraged me to continue collecting. This was of the more importance, as the other boys had derided the pursuit, and I had felt somewhat ashamed of being seen digging for the fossils. From that time I became a geological collector, and extended my researches to all the excavations and cliffs within reach, as well as to the cargoes of limestone imported to supply the limekilns near the town. In these I found shells, crinoids, and other marine fossils.

About this time there came into my hands a series of popular articles, published in the *Penny Magazine* of the Society for the Diffusion of Useful Knowledge, which gave a comprehensive summary of the facts of geology as then known. I was thus able to pursue with some intelligence the forming of a collection, and to explain to others the meaning of my efforts. Not long after, I was so fortunate as to make the acquaintance of Mr. Richard Brown, F.G.S., then manager of the

Sydney coal-mines, a sound and well-informed geologist, and author of the "Sketch of the Geology of Nova Scotia," appended to Haliburton's history of the province. He looked over my little collection and gave me some useful information. Dr. Gesner also, who was then collecting materials and soliciting subscriptions for his book on the geology of Nova Scotia, delivered a lecture on the subject, which was of some use to me, especially in regard to mineral localities. I obtained from him a few named specimens of minerals from the western part of Nova Scotia in exchange for some of my fossils.

After I entered college, I took longer excursions in the vacations. One of these was an expedition to the wonderful coast-cliffs of the South Joggins, on Cumberland Bay, an arm of the Bay of Fundy. The grotesque name of this place is supposed to be of aboriginal origin, and to be derived from the Micmac or Malicete language. These remarkable cliffs had already been mentioned by Brown and by Gesner, but had not been described in detail, and I was naturally desirous to see them for myself and to collect specimens of their fossils. The locality, however, was somewhat distant from Pictou, and the means of

getting there not very direct. The kindness of an old friend of my father's, the Hon. Daniel MacFarlane, gave me the opportunity I desired. He had occasion to visit Amherst, only fourteen miles from the nearest part of the Joggins shore, and offered to take me with him so far. We travelled for the most part by night, or in the evening and early morning, to avoid the heat of the day. From Amherst, I set off early for the ferry at the estuary of the Herbert River, crossing the pleasant Amherst marsh-lands, through clover-scented fields. On arriving at the ferry, the tide being low, I had an hour or two to wait. (The great tides of the Bay of Fundy extend into all its branches and estuaries, and restrict navigation to the time of high water.) I reached Minudie, a village some miles from the nearest part of the Joggins shore, only to find that there was no conveyance or practicable road, except for walking. So, armed with my hammer and a basket for specimens, I set out for the shore by a mere track through the woods. After a warm walk, I came out on the coast at the grindstone quarries of Lower Cove, where, as it was now evening, I was glad to find supper and a bed in the rough building occupied by the quarrymen. The

grindstone of the Joggins is a curious illustration of a little nicety in the work of nature. It owes its celebrity, as well as its sale and use, to the circumstance that the grains of sand composing it are very uniform in size, sharp, angular, and loosely cemented together, which qualities are exactly those required.

The tide being low in the forenoon, I rose early next morning, and taking some luncheon in my basket, walked along the shore to the south-westward for several miles. I was amazed at the grand succession of stratified beds exposed as plainly as in a pictured section, and was interested beyond measure in the beds of coal, with all their accompaniments, exposed in the cliffs and along the beach, the erect trees (*Sigilaria*) represented by sandstone casts,[1] and the numerous fossil plants displayed in the beds. The tide favoured my expedition, and the day was fine, though small banks of fog drifted up the bay from time to time, dissolving as they touched the cliffs, warmed by the sun. I returned in the evening to the quarrymen's shanty, thoroughly fatigued, but loaded with fossils, delighted with the knowledge I had acquired, and with my enthusiasm

[1] See "Acadian Geology": description of Cumberland coal-field.

for geology raised to a higher point than ever before. Such was my first visit to the celebrated coast-section of the Joggins, on which I have since spent so many pleasant and profitable days.

Another such expedition was my first visit to the Minas Basin. On this occasion my father, who had some business in that part of the country, took me with him. We drove in a light carriage along the north shore of the basin from Truro westward. At the Five Islands we left the highway, and continued along the beach at low tide, passing close to the base of great cliffs of volcanic agglomerate, and alighting occasionally to collect the crystalline minerals which abound in the veins and cavities of this rock. The beautiful scenery of this coast greatly impressed me, owing to its difference from the tamer shores of eastern Nova Scotia; and the complicated relations of the volcanic rocks with beds of triassic red sandstone and dark carboniferous shales, afforded intricate and novel geological studies. Our solitary drive along the wide expanse of flat shore, exposed at low tide between the dark masses of the two islands and the great cliffs of the mainland, and our scrambles around the rugged sides of Partridge Island and Cape

Sharp, with the curious and beautiful minerals we collected, are bright spots in my memories of early days ; and many of the specimens then obtained are still preserved in the Peter Redpath Museum.

Another geological excursion was made about this time, in company with Mr. George Thompson, to Cape Blomidon, the most prominent and beautiful feature in this part of Nova Scotia, as well as a remarkable example of an outflow of volcanic rock over the triassic red sandstones. Practical studies of this kind undertaken by me as a novice in geology were profitable employment for vacations, and gave me some general acquaintance with the features and productions of my native province.

It was at this time that I obtained a copy of Lyell's "Elements and Principles of Geology," in this edition united in one volume. I had also read De la Beche's "Manual," and Phillips' "Elementary Geology." These works did much to give definiteness to my ideas on the subject, but I still greatly felt my deficiency in practical knowledge of rocks, minerals, and fossils, as well as in the methods of field work ; and that I was, after all, as yet but an untrained amateur.

At the close of the few busy, and on the

whole happy, years of college life, came the question of a career, professional or otherwise; but here the dark shadow of my brother's death crossed my path and tended to modify my course. I was now an only child, and it seemed to be my duty to remain with my parents and to sustain them in their declining years. My father's affairs had also by this time attained to a prosperous condition, and I might hope, as his assistant and successor, to enjoy a sufficient income, with some time and opportunity to follow scientific work, or to promote the educational and religious interests of our community, and of my native province, for which I entertained a strong patriotic feeling. My own views had undergone a great change, and had I then entered on any professional career, it would have been that of the Christian ministry, towards which end, after my academical course was finished, I had applied myself to the study of Hebrew and allied subjects, which I afterwards followed up in Edinburgh. In any case it would, I think, have been only in favour of this—to them the highest of all functions—that my parents would, at that time, have willingly devoted me.

CHAPTER III

STUDENT LIFE IN EDINBURGH, AND RELATIONS WITH LYELL AND LOGAN

THUS far no systematic instruction in geology had been accessible to me. All my knowledge had been acquired from books, or by my own observation. My collections and notes, however, already covered some of the more important geological formations of my native province, and I had begun to be regarded in my own locality as an authority on the subject. Other departments of natural history were represented in my collections—birds, insects, and molluscs especially—and I had a considerable herbarium of native plants. I now longed for some means of special instruction; but in those days scientific schools were to be found only abroad. Thus, after some thought and inquiry, it was decided in our little family council that I should have a session in Edinburgh, where there seemed to be good opportunities for obtaining the training desired.

The journey was undertaken in the autumn

of 1840 in a timber-laden ship, the *Harvest Home*, Captain Thompson, bound for Newcastle, a somewhat out-of-the-way port for a passenger from the west, but which had the advantage of being less distant from Edinburgh than some others more easily reached from America. Towards its close the voyage was a stormy one, and one night a sea broke on board which cleared our deck from stem to stern, tore away a large part of the bulwarks and injured two of the crew, besides destroying the wheel. The whole was the work of a moment, but left our ship an apparent wreck, as well as deluging the cabin with water. The storm abated as we entered the English Channel; and I was delighted with the beauty of the coast—seen at no great distance—as we passed in leisurely succession the cliffs of Cornwall and Devonshire, the rocks of the Isle of Portland, the green fields and woods of the Isle of Wight, the banks of Beachy Head, and the chalk cliffs of Dover—all already familiar to me by name through my geological reading. How I longed to be on shore, to examine their rocks and collect their fossils! Our difficulties were, however, not yet over, for in the North Sea we were again assailed by storms, and had to run before

a violent southerly gale, in very thick weather, through the dangerous shoals of the east coast. In the end we were driven far beyond the Tyne, and found ourselves near the historic island of Lindisfarne. Returning, when the gale abated, we passed the bar of the Tyne with some difficulty in a heavy sea. A glimpse of Flamborough Head, towering over us on a sudden lifting of the mist, and the many heavily-laden colliers, passed by us, lying-to with the sea washing over their decks, remain as vivid pictures.

I stayed a day in Newcastle, and saw a little of this busy, smoky town, with its steep streets and stairways. On the one evening I passed here, I was introduced to a debating club of young men, and having taken some little part in the discussion, was complimented by a member on my speaking English so well. Possibly he supposed that my native tongue was Chippewa or Micmac! This ignorance was an intimation of the insignificance of my own country that did not pass unnoticed. To Edinburgh I went by stage, and as the weather was cold and part of the journey to be by night, I thought it prudent to take an inside place, but was surprised to find that every one but myself was content to sit outside—a lesson to me in

that economy, so common in Scotland and in the north of England, which prefers discomfort to a little extra expenditure. In those days, before there were railways in the north, travelling was costly, and the poor man must stay at home, trudge on foot, or, at the best, must be content with the outside of the coach. Even in the inside I found the November night miserably cold, and learned that in the winter I might expect to suffer as much from that cause in Scotland as at home. In the morning I awoke from an uneasy sleep, to find myself in the High Street of Edinburgh, amid loud voices speaking in broad Scotch.

On arrival, I was received most cordially and hospitably by friends, to whom I had brought letters of introduction, and proceeded at once to enrol myself as a student in the University. As no entrance examination was required, I took out a ticket of matriculation in order to obtain the privileges of a regular student, although I proposed to devote myself entirely to studies in natural science. In addition to the general course of the Pictou Academy, I had a fair knowledge of the elements of chemistry and of physics, and could thus profitably enter on special studies. Besides attending lectures, I spent much time in the

University museum, and, providing myself with Maclaren's excellent book on the local geology, made frequent excursions in the vicinity of the city, both for exercise and practice in observation. I also read extensively in the library, making notes, abstracts, and drawings from books to which I could not have had access at home. The results of this winter's study were most valuable to me. Jameson, my principal geological teacher, devoted a large part of his earlier lectures to physical geography, and the remainder mostly to minerals and rocks, and it happened that these were just the points in which I was weakest. Later on, I was surprised to find how little even some of the more eminent English geologists of that day seemed to know of mineralogy, and consequently how uncertain was their diagnosis in the field, of the nature of rock masses. At the same time, I regretted that I could not obtain any systematic instruction in palæontology, in geological surveying, and in some other important subjects.

It became imperative for me to leave Edinburgh in the spring of 1841, but I determined, if possible, to return to complete what I had there begun. I knew that, in the meantime, I should become more fully aware of my defi-

ciencies in the knowledge necessary to the success of an observer, isolated as I should be from the centres of science and from the aid of specialists, and thrown entirely on my own resources. The interruption of the continuity of my studies was thus, in some respects, an advantage, especially as, in the interval, I had the privilege of associating in field work with Lyell and Logan.

Whilst in Edinburgh, I received much personal kindness and useful guidance from Jameson, Forbes, Balfour, and other leading men connected with the University. I also enjoyed the acquaintance of Alexander Rose, a most single-hearted and earnest man, and an excellent mineralogist,— being a special authority on the minerals of Scotland and Iceland. It was through him that I was introduced to Mr. Sanderson, the lapidary, who had sliced fossil wood for Witham and Nicol, and from whom I learned something of the art of preparing transparent slices of rocks and fossils for the microscope, which was afterwards of great advantage to me, although I never made this work a specialty, but employed it only as an accessory in general geology.

Even Edinburgh, in the years when I at-

tended its classes, was a very imperfect school of natural science, compared with those that now exist, but this imperfection was chiefly in minor specialties. There were many able and enthusiastic teachers, and, to a diligent student, pursuing a well-selected course, it gave a good general groundwork, suited to the requirements of the time. To any one prepared to build on it, by practical work, in the directions which his own gifts, or the nature of his field might indicate, the training thus acquired was likely to prove of great value. Whilst thus in pursuit of special education, I had also the benefit of learning, incidentally, something of the motherland and its institutions. I listened to the voices of some of its great orators and preachers, and, in Edinburgh, had the opportunity of knowing a little of the work of Chalmers and his contemporaries, and of witnessing the earlier signs of the national uprising, which led to the disruption of the Scottish establishment. My residence in Edinburgh also led, though some years later, to my entering into the most sacred and important of all relationships; but to this I must refer in a subsequent chapter.

It so happened, and I cannot help regarding this as one of those providential coincidences

which regulate the affairs of men, that in the summer succeeding my return from Edinburgh, in 1841, I met with two great geologists, whose friendship followed and assisted me through the earlier years of my career. These were—Sir Charles Lyell, who more than any other man gave form to modern geological science; and Sir William Logan, who gave the first great impulse to the systematic geology of the older rocks of the North American Continent, and originated the Geological Survey of Canada. To other men who have passed away, and whose friendship I have enjoyed, I owe much: Jameson, Murchison, Bigsby, Miller, Sedgwick, Phillips, the Carpenters, Hall, Agassiz, Salter, Dana, and Hunt, have all assisted me by their teaching and friendly co-operation; but to Lyell and Logan I owe most.

Lyell spent some time in Nova Scotia on the occasion of his first visit to America, in the summer of 1841. Being, at this time, specially interested in the correlation of the coal-bearing rocks of North America with those of Europe, he naturally visited the Pictou coal district. He had letters of introduction to gentlemen connected with the General Mining Association of London, then working the principal coal-seam of the district,

and one of these, Mr. Alexander P. Ross of Pictou, introduced me to him, and brought him to see my collection. He looked over my specimens with appreciation, and listened with interest to what I could tell him of the geology of the beds in which they occurred; especially, I could explain to him that the extensive deposits of reddish sandstones in the northern part of the county, which, under the name of New Red Sandstone, had been supposed to be much newer than the coal formation, were in reality connected with that formation. The evidence of the fossils, and the stratographical relations, also showed that certain beds on the south coast of Prince Edward Island were allied to them, though of somewhat later date. At that time we had not thought of separating these beds into three distinct groups—of Upper Coal formation, Permian, and Trias. Various names have since been given to them, but their actual relation to each other, as made out by me, has stood the test of time.

Many years later I referred to Lyell's visits to North America, and to his personal influence and genius as I knew them, in the following terms:[1]—

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[1] Presidential address to Natural History Society of Montreal, 1875.

"The benefits rendered by Lyell to American geology, in connection with his several visits to this continent, it would not be easy to overestimate. At the time of his first visit, few English geologists had seen those great breadths of the older, and of the more recent formations, by which this continent is distinguished, or had had the means of realising for themselves the resemblances and differences of the formations on the opposite sides of the Atlantic; and American and British workers in these subjects were little known to each other. The visits of Sir Charles Lyell did much to remedy all this. His own mind was filled with those grander aspects of geological phenomena which appear in America. He brought into correspondence with each other such workers in science as his intuitive tact perceived to be suited to give mutual aid. In British America, in particular, his agency in this way was very valuable in bringing together the widely-separated cultivators of science, and in linking them with the scientific movements of the mother country.

"Nor were his visits barren of purely scientific results. He may have made few discoveries of new facts—and he had not time

to enter into detailed stratographical studies—but in a thousand instances he cast new light on obscure investigations, gathered into a harmonious union detached fragments of evidence, and suggested new conclusions and interpretations. Of this character were, his rearrangement of the carboniferous rocks of Nova Scotia and New Brunswick, and the clear conceptions which he formed of the nature and origin of our post-pliocene formations, which are still, I think, in advance of those currently taught on this side of the Atlantic.

"Limited though his time for observation was, he always seized the salient and important points of any formation or locality, and I have often been struck with the truthfulness and completeness of the sketches which he gave of phenomena, with reference to which his opportunities of collecting information were very imperfect.

"In these American researches, the great gifts of the man were brought out in a light somewhat different from that in which they appear in his general works. The main distinction between Lyell and most of his contemporaries was his eminence as a thinker, whether in inductive or deductive reasoning. Like most of the English geologists of his

time, he had received less training in the characters of minerals and rocks than that which the more severe schools of science exacted, and his imperfect vision was a great hindrance in field work, and sometimes even a source of personal danger; but when facts, however complex, were once obtained, they grouped themselves in his mind in their natural relations with an unfailing certainty, while their connections with all the other parts of his vast stores of knowledge, and the general conclusions deducible from them, came out with a degree of clearness always beautiful, and often even startling.

"Another quality of his mind was the fresh and vivid interest, almost childlike, which every new truth awakened in him. This feeling is more or less that of every true naturalist. It depends on the clear perception of what is presented to us, and on the keen realisation of its relation to things previously known, and perhaps still more on the sudden breaking of those new relations upon the mind, as if with a flash of divine light. I well remember how, after we had disinterred the bones of *Dendrerpeton* from the interior of a large tree on the Joggins shore, his thoughts ran rapidly over all the strange circumstances of the burial of

the animal, its geological age, and its possible relations to reptiles and other animals, and he enlarged enthusiastically on these points, till, suddenly observing the astonishment of a man who accompanied us, he abruptly turned to me and whispered, 'The man will think us mad if I run on in this way.'

"An allied feature of his mental character was the readiness with which he accepted new conclusions, and relinquished without regret views which he might have long held, when he perceived them to be shaken or untenable. He seemed wholly free from that common failing of men of science which causes them to cling with such tenacity to opinions once formed, even in the face of the strongest evidence. This quality eminently fitted him to be the expositor of a rapidly advancing science, and also to be the patron and helper of younger and less eminent men, and was connected with that warm and earnest interest which he ever felt in the progress of knowledge, and with the deference with which he received new facts and suggestions from any quarter.

"These qualities, apparent in his connections with American geology, were equally valuable in his relations to science in its general aspects. A man so gifted, fortunate in his genius, his

education, his outward circumstances, and in his appearance on the stage at a time when geology had gathered in some of its greatest harvests of facts, and was waiting for a master-mind to arrange them, had a great opportunity, which Lyell had the energy and ability to seize. He was thus able to become a guiding mind among his contemporaries in geological theory, and to hold his pre-eminence down to the end of his life, and through all the great changes which occurred in the rapid development of the science.

"The position which he occupied is one to which he was in every way justly entitled. His large and judicial mind had always a clear perception of the true method of natural history. He saw that the foundations of our knowledge of geology were to be laid in extensive and accurate collections of facts, and in reasoning on these by severely inductive methods. This idea he carried out in his 'Elements of Geology.' But in his 'Principles' he opened up a new field, not, as has been crudely conceived by some commentators on his work, one of the nature of deduction, as distinguished from induction, but rather another inductive investigation, leading to general conclusions as to the changes now in progress, in

order that, by a fair use of analogy, a key might be found to the interpretations of the facts and conclusions obtained by the study of the geological monuments of past ages. He has himself well stated this view of the case in the preface to the tenth edition of the 'Principles.'

"Viewed in this way the Lyellian geology rests on two inductive bases: the first relating to the facts discoverable in the earth's crust, and the second to the changes now in progress under our observation, and the connection of these, by an analogy, founded on identity of causes or conditions and identity of effects. This mode of treating the history of the earth was especially that of Lyell, and it was this that constituted his greatest contribution to the growth of modern geology.

"It is always interesting, in the case of a great student of nature, to ask what position he took in regard to those higher problems which directly affect man in his mental, moral, and spiritual nature. There is nothing in the study of nature to withdraw a man from sympathy with his fellows; and men of science who have so shut themselves up in their specialities, as to take no interest in the general welfare and progress of society, have necessarily failed

to secure for themselves and their subjects the hearty interest of mankind. In these respects Lyell was characterised by the same breadth which appears in his scientific investigations and reasonings. He was a warm personal friend, and full of sincere sympathy with all that concerned those he loved. He was active and earnest in promoting education and the diffusion of knowledge, and he took a lively interest in all movements for improving the social and political condition of the world at large. He was quite free from that tendency to attack or sneer at, everything that other men hold sacred, which characterises some of the advanced writers of the day. He neither tormented himself with the gloomy idea that men looked askance upon him, and wished to persecute him, nor did he desire to make any other man a martyr to his faith. In the earlier editions of the 'Principles,' he closed the work with a few paragraphs of 'Concluding Remarks,' in which he takes occasion to state his doctrine of the relation of natural science to religion in the following words, which, I find, remain unchanged in the latest edition:—

"'We aspire in vain to assign limits to the works of creation in space, whether we exa-

mine the starry heavens or that world of minute animalcules which is revealed to us by the microscope; we are prepared, therefore, to find that in time also the confines of the universe lie beyond the reach of mortal man. But in whatever direction we pursue our researches, whether in time or space, we discover everywhere the clear proofs of a Creative Intelligence, and of His foresight, wisdom, and power. As geologists, we learn that it is not merely the present condition of the globe which is suited to the accommodation of myriads of living creatures, but that many former states also were adapted to the organisation and habits of prior races of being. The disposition of seas, continents and islands, and climates have varied, the species likewise have been changed, and yet they have all been so modelled on types analogous to those of existing plants and animals as to indicate throughout a perfect harmony of design and unity of purpose. To assume that the evidence of the beginning and end of so vast a scheme lies within the reach of our speculations, appears to be inconsistent with a just estimate of the relations which subsist between the finite powers of man and the attributes of an Infinite and Eternal Being.'"

Logan I first met in the same year (1841). He had come to Nova Scotia to familiarise himself with the carboniferous rocks, as developed there, in the interest of the Canadian Geological Survey. In the autumn of 1843 he again unexpectedly presented himself, in rough and weather-stained attire, and explained that he had spent the summer in Gaspé, where it had been reported that coal had been found, and had commenced there his great survey of Canada, in the hope — not destined to be realised—of the discovery of productive coal-measures. He had, however, accumulated a great mass of notes on the geology of that interesting region, and was full of anecdotes of the adventures he had met with. At the close of the summer he had taken passage to Pictou in a schooner to wait for the steamer for Quebec. His visit was short, but we spent many hours over his notes and drawings of fossils, which showed that he had been studying rocks older than those of the carboniferous system, and therefore not likely to contain coal. He showed me drawings of fossil plants he had observed, which, for the first time, gave me the idea I afterwards followed up, that Gaspé might afford a fossil flora much older than that of the coal formation.

Logan and Lyell, both able geologists, were men of entirely different stamps. The former was all for observation, measurement, and careful plotting and sketching, and therefore admirably fitted for the work of a detailed survey; the latter observant, yet always full of thought and comparison, and endeavouring to realise on the spot the relations of what he saw.

When travelling with Lyell, I told him frankly my plans, and my intention of remaining with my parents so long as they should have need of me, unless any attractive opening for scientific employment should appear. He approved of these, advised me to extend my studies and observations, and to throw my work into the form of papers for scientific societies. I remember too, that he cautioned me against entering into educational work, unless of such a kind as to give time for research, mentioning that many promising men had, in his experience, been lost to science in this way.

To me, from that time, the friendship of Lyell was of the greatest moment. His letters abounded with hints as to the newest subjects of discussion in geology; he was always ready to do anything in his power to advance my scientific or personal interests; and, as will

appear in the sequel, his placing me in relation with his friend Sir Edmund Head, had an important influence on my later life. In regard to local researches, his interest in the relations of the different members of the carboniferous system, led me to study these with care, and to prepare a series of papers on them. Our finding of reptilian remains in the interior of the erect trunk of a fossil tree at the South Joggins, led to an important series of discoveries. He entered, too, with zeal into my work on Devonian plants, and into those investigations of the fossils of the Laurentian limestones, in which, after my removal to Montreal, I was engaged, in connection with Logan, Carpenter, and Hunt.

With the memory of Sir Charles I must cherish that of his highly-gifted wife, a worthy helpmate for such a man,—who won the affection of all his friends by her geniality and true-heartedness, whilst in some departments of natural science she had attained a mastery that ensured respect, and enabled her to render important aid to her husband.

CHAPTER IV

MARRIAGE

BEFORE going further with these reminiscences it will be necessary to refer to an event which, in many respects, one is justified in regarding as the most important of all—namely, my marriage.

It was on my first visit to Edinburgh that I became acquainted with my future partner in life, and before long I came to regard her as one who, if I could but win her to share my lot, would at once assure my domestic happiness, and would afford a stimulus and incentive to fight well the battle of life. Truly, to love worthily a good woman is the first feeling that raises a youth to real manhood; and to win the love of such an one in return is to attain to the highest happiness that the world can bestow.

The Mercers were of an old Scotch family, resident at that time in Edinburgh, and it was to Margaret, the youngest daughter of the house, that my affections went out. It was

not, however, possible that my hopes and wishes could immediately be realised. I had barely attained my majority, and was as yet but a student. She, too, was little more than a girl, and had not at the time completed her education. I had ample opportunities of cultivating her acquaintance, but no word of love was spoken between us, and when I said goodbye to Edinburgh for the time, all I asked of her was that she would answer such letters as I might find opportunity to send from Nova Scotia. Our correspondence only deepened my feeling of attachment, and at length when I had to a certain extent assured my position and prospects, I ventured to ask her to marry me. It may be that I acted unwisely, and I certainly received a most emphatic rebuke, backed by reasons sufficiently cogent to have deterred, if not to have convinced, any one less interested and determined. It only remained to apologise for too great precipitance, and to wait until the opportunity offered, some years later, of pleading my cause in person,—this time with better success.

I felt deeply then, and I still feel now, that the circumstances surrounding our marriage imposed upon me an unusual degree of responsibility. My young wife had to leave a

large and attached circle of friends and relations, a city second to few in its privileges and advantages, and had to cross an unknown sea, and to enter on the new and untried conditions of a young and comparatively crude country, with none but strange faces around her. A man in such a case, may well distrust his powers of fulfilling the duties and responsibilities he has undertaken, but will have, at least, the strongest incentive, to justify to the full the faith placed in him. In our case, we both had a higher faith in a God who does not desert those who put their trust in Him, and went forth determined to keep ourselves "unspotted from the world," as well as to use all opportunities for good that might come in our way. Our union was one of mutual affection, esteem and respect, and it has been, I believe, wholly a blessing to us both. To me it has been the crowning joy of my life. My dear wife has not only been all that I could have wished for myself, but has also proved herself fitted to adorn every position in which we have been placed, while to her wisdom and affectionate aid, I am justified in attributing a large share of anything I have been able to achieve, as well as of any measure of success I have been enabled to attain in

life. We have been blessed with six children, one of whom has "gone before" into the Master's presence. The others have left us, at different times, to launch out into the world on their own account. It is only just to say, that if they have been able to do credit to us and to themselves, this is mainly due to the wise and loving influence of their mother.

Through the goodness of God, we were able, fifty years later, to celebrate in Montreal, our golden wedding, in March 1897, surrounded by our children and grandchildren, as well as by numerous kind and sympathetic friends.

My voyage to Scotland in 1846 was not without incident. Although the Cunard steamers were already running successfully across the Atlantic from Halifax, passengers from other seaports in Nova Scotia frequently went by sailing ship, when time was not an important consideration. I took passage in a fine large ship, sailing from Pictou to Glasgow, in November, when a short voyage might be anticipated. We expected to pass through the Strait of Canso, where we were to drop our pilot and a passenger, but a fierce southerly storm set in, drove us from our course, and forced us to pass to the north of Cape Breton

Island. It thus happened that no letters could be sent ashore, and my parents in Pictou were left in entire uncertainty as to what had befallen me, until after my arrival in Scotland and the return of the mails. In the meantime, news came from the Magdalen Islands that a large timber-laden ship, similar to that in which I had sailed, had been totally wrecked there, but as these islands were inaccessible during the winter months, no further details could be expected until the spring. My father, on learning this, at once wrote to Scotland telling our friends, of the misfortune which, as he thought, had overtaken us; so it happened that when I arrived in Scotland, after a somewhat long voyage, I appeared like a Jonah given up by the sea.

During the winter, my studies at the University of Edinburgh were resumed, my attention being directed particularly to the courses in natural science; and in the spring of 1847, I returned with my wife to Nova Scotia.

CHAPTER V

EDUCATIONAL WORK IN NOVA SCOTIA

About the year 1849, an effort was made to infuse new life into Dalhousie College, an institution which had received a small provincial endowment, and possessed a building in the city of Halifax. Dr. McCulloch had been transferred some years before, from his position in Pictou, to be its principal; but on his death it threatened to lapse into a decaying state. In these circumstances it was suggested that, for one year, a series of extra-academical lectures on scientific and other subjects should be delivered, to which the public might be admitted—a sort of anticipation of the "university extension" movement of our time. An invitation was given to me to take one of these courses,—on natural history subjects. I had already delivered a short course in the Pictou Academy, besides lecturing before our local scientific society, so that the work was not altogether new, and the opportunity was one

that might be of service as a preparation for other scientific pursuits. I therefore accepted the offer, and repaired at the beginning of winter to Halifax, where my wife joined me a little later. I lectured to a large class, partly composed of citizens and partly of pupils of the higher schools, as well as of students of Dalhousie. Finding that some interest was aroused, I organised a practical class for special subjects, particularly mineralogy and the study of fossils, and made excursions with the members of this special class, to collect objects of interest. The course was thus, on the whole, useful from an educational point of view; and at its close, I was presented with an address by the members of the class, and my wife with a tea-service, in token of gratitude. At the same time, I obtained some confidence in my power to interest students. It was not intended that the engagement in Dalhousie should be for more than one session, but it led to other employments, as will appear in the sequel.

In Halifax, my wife and I were necessarily brought into association with many of the leading people of our provincial capital, and especially with those interested in science and

education. My old friends, Young and Howe, were then members of the Government, as well as of the Board of Dalhousie College. They were engaged with an education law, in which provision was made, for the first time, for a Superintendent of Education; for periodical visits on his part to the different counties; for the holding of educational meetings, especially for the purpose of preparing the public mind for the establishment of a Normal School, in which teachers might be trained; for assessment for the support of schools, and for other amendments in the school system. They spoke freely to me of their plans, and of the best means of introducing improvements in education throughout the country, without interfering with any good work already in operation; and I was, of course, glad to give any information in my power. There was, however, no anticipation on my part that I would have anything further to do with the administration of the law, as I had no thought of being a candidate for the new office which it was intended to create. I was therefore surprised, and I must say somewhat distressed, when, in the following spring, I received a letter from Mr. Howe offering me the office of Superintendent of Education. My first impulse

was to decline. I had not been a professional teacher, and, in my pursuit of science, had naturally allowed much of my elementary education to fall into desuetude, at least in so far as technical education was concerned. I was also busy in working up the local geology, and in preparing papers thereon, for the Geological Society of London; and I was beginning, by work at Arisaig and in the southern part of Pictou county, to extend my observations to the formations older than the carboniferous. The office also was likely to be very laborious, and might meet with many of the difficulties incident to the introduction of new and untried methods.

Howe, however, would take no refusal, and among other things suggested that, as the office was in the first instance to be one of visitation and inquiry, it would give unusual opportunities for becoming acquainted with all parts of the province, as well as with local collectors and students. It was proposed by the new law to introduce the teaching of agriculture into the higher schools, and it would therefore be proper for the superintendent to interest himself in all questions relating to soils and other matters of importance in scientific agricul-

ture. At length, though not without hesitation, I consented, stipulating, however, that I should have a few months to visit educational institutions, and to collect information, in the United States and Canada, so that I might be able to speak with more authority on questions of school improvement.

Thus I was launched for three years on an entirely new career, of a most active and exacting nature. In summer I travelled from county to county, convening meetings of the commissioners of schools and of persons interested in education; examining schools and collecting statistics concerning them; lecturing on education, and explaining the means of introducing agriculture into the schools; occasionally convening teachers' institutes in central places; introducing uniform text-books and new apparatus; devising plans for better schoolhouses; and with all this carrying on a geological reconnaissance and collecting specimens. In winter, in addition to much correspondence and issuing an educational journal, I worked up my statistics and reports, and spent much time in Halifax, explaining to members of the Legislature my new educational projects. I also, chiefly in

the evenings, wrote out my geological observations for the Geological Society, and made extensive notes in preparation for a separate work on the physical geography and geology of the province. In all this, my energies and strength were taxed to the utmost, and at the end of the second year, after some weeks of travelling in inclement weather and the fatigue of a large teachers' institute at Truro, I was barely able to reach home, in the first stages of a fever, which I had contracted somewhere on my route, and which confined me to my bed for many weeks. It brought me near to death, and but for the assiduous attention and skill of our physician, Dr. W. J. Anderson, and the careful nursing of my wife, might have finished my earthly career. As it was, it left me neither time nor strength, to get passed through the Legislature certain amendments and additions to the school law, which seemed essential to further progress. The results, however, up to this time were encouraging: intelligible statistics as to the schools had for the first time been collected; some unity had been introduced into the work of the local commissioners of schools; improvements had been made in books,

apparatus, buildings, and methods of teaching; and a large proportion of the people had become convinced of the necessity of systematic means for training teachers, and of more uniform and effectual provision for their support. Toward these last objects I found that the convening of numbers of teachers, and of the more advanced educationalists, in institutes, the establishment of local associations of teachers, and the delivery of public educational addresses, were most important means.

The two weakest points of our educational system were, the want of a Normal School for training teachers, and of a compulsory assessment for the support of schools. These two deficiencies were insisted on in public meetings, and in interviews with members of the Government and Legislature, as well as in my reports. Finally a Normal School was established. It soon proved to be of the greatest utility, and has become an essential factor in the educational system of Nova Scotia. It was not until some time after I had resigned my office, that assessment for the support of schools was introduced, greatly to the advantage of education. For this measure Nova Scotia has to thank Sir Charles Tupper, who was a

leader of the political party opposed to that which appointed me. He was, however, always friendly, and made no opposition to the new School Law and the changes under it; and when, in turn, he and his party came into power, he had the courage to perfect this measure, at no small risk to his own popularity.

In the execution of my work as Superintendent of Education, it had to be borne in mind that the commissioners of schools in the several counties were men of age, standing, and experience, who, to their own satisfaction, and without any remuneration, had managed the local educational affairs, and who might be jealous of a new educational authority tending to unsettle their old ways. Thus, I determined to commence my mission modestly, as became a comparatively young man, and to proceed on the principle that what was well might be left as it was. In convening educational meetings, therefore, ground was usually broken by requesting the commissioners of schools in each of the counties to make arrangements for such a meeting, at which it was my function to preside. Before the day fixed, I was in the locality, conferring with the commissioners, teachers, and leading men, and

securing the attendance of as many as possible. The meeting was opened with a brief explanation of its objects, and the intention of the law, and discussion was invited as to the special needs of the district. This, almost invariably, brought out statements respecting the defects of education in the locality, much stronger than any I could have ventured to make, and gave opportunity, in summing up the proceedings, to urge improvement, and to explain the facilities offered for it. At the close of one of the earlier meetings, in a county town where some opposition might have been expected, the local member of the legislature, a prominent man in the party opposed to the Government, came to me and said laughingly:—"I had expected to oppose all your new educational notions, but we had to admit so many defects, that it was useless to make the attempt." On the whole I found no factious opposition, and in every district some intelligent and progressive men of all parties and creeds, ready to sustain any reasonable proposals for educational improvement. The much vexed question of separate schools has, I am glad to say, never arisen in any grave form in Nova Scotia. The plan of having mixed boards of commissioners, and

for conciliatory arrangements in districts where there is a Protestant or Roman Catholic minority, have, except in some of the larger towns, allowed the school system to be a common one, without prejudice to the religious interests of any creed.

I had never intended to remain permanently as an educational officer, and the illness above referred to, with the requirements of my own affairs, obliged me to make preparations for resigning, in my third year of office, in favour of my friend the Rev. Dr. Forrester of Halifax, a man, in my judgment, much better fitted to carry out the details of educational reform, especially in connection with the new Normal School, of which he was to be the principal, and which was to be established in Truro, a place very central and convenient, and very likely, when railways were introduced, to become even more important and accessible. I remained in office for a time, as one of the commissioners for the foundation of the Normal School, and this was my last official association with the schools of Nova Scotia. My work in relation to them was that of the pioneer. Since that time these schools, and those of the other maritime provinces, have advanced greatly in all respects,

and have attained to a degree of perfection scarcely to have been anticipated in the early fifties. To some extent this has been on the lines which I sketched out; and when, in 1888, I attended a great interprovincial convention of teachers in St. John, New Brunswick, which included some of the men and women who were teachers when I was superintendent, I could honestly congratulate them on the high position that they had attained in their educational work.

In connection with the proposal to introduce education in agriculture, I prepared and published, "Contributions toward the Improvement of Agriculture," and at the request of Sir Gaspard Le Marchand, then Lieutenant-Governor of Nova Scotia, and an enthusiast in agricultural matters, in a second edition, I added a treatise on live stock. This little work, though intended only for local use, had an important influence in stimulating and guiding agricultural improvement throughout the maritime provinces, and even beyond their limits. The "Contributions," at a later date, formed the basis of a text-book prepared for the use of the McGill Normal School in Montreal. I also wrote and published a handbook of the "Geography and Natural

History of Nova Scotia," and compiled a school map. These supplied at the time well recognised needs, but are now superseded by later works. A continuous thread of geological observation and discovery extended through my educational work, and as a sequel to a number of papers in the *Journal of the Geological Society*, my "Acadian Geology" was issued in London and Edinburgh in 1855. All these literary ventures were made at my own cost, and had no direct public aid.

At the time of which I am now speaking there were, of course, no railways in the province, and the means of communication were in some districts of the most primitive kind. My educational and geological journeys were therefore not only attended with much labour, but occasionally with some risk. A few incidents connected with such journeys occur to me.

One afternoon, early in April, I drove over the north mountain of Cornwallis in a light snowstorm in company with the Rev. Mr. Summerville, to Black Rock, on the Bay Shore, to address an educational meeting called in that somewhat isolated locality. It was held in a large kitchen, the most commodious room in the place, the company being

seated in chairs and on forms, in front of a blazing wood fire. By chance I learned from some of those present that a large fall of the trap cliff had occurred a few miles along the coast, and at once decided to visit the spot, although I had an engagement to lecture next evening at Aylesford, twenty-five miles distant,—the roads not being of the best at that season of the year. So I arranged with some fishermen to have a boat ready at daybreak, reached the fallen cliff after some difficulty, caused by a heavy sea, examined the section exposed by the fall, and found among the débris an amazing quantity of fine zeolites, with which we loaded our boat, and returned to Black Rock in time to pack the specimens before breakfast. After visiting some schools by the way, I made good my engagement at Aylesford, and others farther west.

In continuation of the same expedition to the west, I left Digby for Briar Island, the extreme western point of Nova Scotia, and passed the night at Sandy Cove, on Digby Neck, one of the most picturesque spots on this coast. It is a nearly circular notch in the hills, which rise around it in the form of an amphitheatre, giving it the appearance of a volcanic crater, broken down at one side.

My lodging was at a new house, lathed but not yet plastered, so that when lighted at night it resembled a series of bird-cages. The owner was absent on a fishing expedition, and his son, a boy of scarcely ten years of age, had gone across the bay alone to join him. Crossing the ferry to Long Island, on which no conveyance was to be had, I walked throughout its length of ten miles, examining its rocks by the way, and in the evening was ferried over to the pretty village of Westport on Briar Island, a typical fishing village, presenting many points of interest. Briar Island is the outlying extremity of the long trappean ridge of the North Mountain, extending west from Cape Blomidon, and separated from Long Island by the Grand Passage which has been cut out by the sea along a line of fracture, or of softer rock. It has space for the town of Westport, and for a single farm, stocked with a few cattle and sheep, the latter living partly on seaweed, which they get on the beach at low water, and which is said to give a very good flavour to the mutton. With the exception of the produce of this farm, the whole subsistence of the people is derived from the rich fisheries on the banks and ledges, which extend along the Bay of

Fundy. These fishing advantages, the nearness to good markets, with the energy and industry of the people, make it a thriving place. I found, too, that besides having every external appearance of prosperity, it possessed two or more neat church buildings, and a good school; and its people boasted that there were no paupers on the island.

At this place, after finishing my educational work and examining some of the bold sea-cliffs, I was detained by a severe storm which prevented me from crossing the Bay to Clare, a settlement of Acadian French, where my next meeting was to be held. Instead, I had the advantage of witnessing the finest exhibition of great ocean waves breaking on a rocky coast that I have ever seen. After the storm came a calm, in which the sloop I had embarked on drifted idly with the tide. The result was, that, after landing some distance from the village, securing a conveyance and driving with all speed to the place of meeting, I found the assembly, after having waited nearly an hour, was beginning to disperse; but they willingly remained, and politely accepted my explanations. I visited here, with some interest, the old church erected by the Abbé Segogne, a Roman Catholic missionary

of the old Gallican type, who took an active part in circulating the Bible among his people. I had also, in a remote part of this district, the rare experience of finding a small school presided over by a female teacher, who knew no other language than French.

On the same educational tour, I had to extend my journey to the other side of the bay—to Advocate Bay, near Cape Chignecto, another outlying corner of our province. I left Parsborough with the postman, who proved by no means a cheerful companion. He loved to point out places on the road where serious or tragical accidents had occurred, and seemed to anticipate some disaster on our journey, perhaps in consequence of his little faith in the value of my educational mission. His fears were so far justified, in that, towards evening, a very violent storm set in, so that, as we were driving through the woods, trees were blown down over the road, threatening our lives, and we had great difficulty in passing some that had already fallen. One of the latter seemed at first to defy our attempts, but on examination, I found that it was so nearly separated from the stump that it could be disengaged by a few vigorous strokes with the sharp edge of

my geological hammer, and then rolled aside. My companion, who had begun to despair of our arriving at our destination, exclaimed: "That shows that there is some good in education after all." We arrived at length, wet and tired and somewhat late for my engagement; but the people were too seriously employed in saving their property from the ravages of the storm, which had been reinforced by an unusually high tide, to attend to educational matters. Our meeting had therefore to be postponed to the next day.

I usually travelled in a vehicle of my own, wherever this was possible, but had elsewhere to use such conveyances as the country afforded, whether by land or water. In one remote district, I once found a log schoolhouse by the side of a road, passing through unbroken woods, which had literally no particle of glass or iron in its structure, and where the teacher was glad to supplement his few books by making use of old newspapers for lessons in reading. I was told that the schoolhouse was built in the "bush" for the convenience of getting fuel, and to suit the wants of two little settlements separated by this tract of forest. I have also met with a school closed, because, as I was informed, the

people's provisions having been exhausted, and the potatoes not yet being ready, the children were obliged to spend their time in gathering berries for food. Such cases were of course uncommon, but, with the many neglected and decaying schools in districts which were able to do better, they showed the need of the kind of missionary work I was carrying on, in which I endeavoured to collect information and to give aid and encouragement in the remotest, as well as in the more accessible, districts. The former were also, as might be expected, often rich in specimens, and facts of scientific interest.

While I was still Superintendent of Education, in 1853, my friend Sir Charles Lyell revisited Nova Scotia, and I had the pleasure of meeting him and Lady Lyell, by appointment, on their arrival at Halifax, and of making with him a visit to the Joggins, in which we were so fortunate as to discover the remains of the first reptilian animal recognised in the coal formation in North America, as well as the first known Palæozoic land shell, and of beginning the explorations of the contents of the erect trees of that remarkable section, which have since produced so many interesting results. I also visited

with him the curious deposit of the mineral *albertite*, at Hillsborough, New Brunswick, which was then a subject of no little interest. We settled its true geological age, as Lower Carboniferous, but were not quite so successful in determining the precise relation of this bituminous mineral to the containing beds. This required further explorations, which we had not time to undertake. It was intended that we should prepare a joint paper on our observations on this journey, but Sir Charles, too much occupied with other pursuits, eventually left the whole matter in my hands. He was at that time on his way to the United States, and took with him the precious reptilian and molluscan remains, which he submitted for preliminary examination to Professor Jeffries Wyman, and to Dr. Gould, who confirmed our determination of their nature. The former were subsequently described by Owen on Lyell's return to England. They proved to be types of a new genus, *Dendrerpeton*.

In the same steamer with Sir Charles and Lady Lyell, were Sir Edmund and Lady Head, to whom I was introduced. I found Sir Edmund much interested in educational affairs in Nova Scotia and New Brunswick,

of which latter province he was then the governor. Lady Lyell went on with Sir Edmund and Lady Head to Fredericton, leaving Sir Charles and myself to make our way to the Joggins. Out of this meeting with Sir Edmund Head grew another educational engagement, for, in the following year, he invited me to join with the Rev. Dr. Ryerson and some other leading men, in reporting on the reorganisation of the University of New Brunswick, then established at Fredericton, but in so unsatisfactory a condition that its legislative support was in danger of being withdrawn. This business gave me further opportunities of studying university matters, and enabled me to form an intimate acquaintance with Ryerson, then the leading school authority in Canada. Sir Edmund attended the meetings of the Commission, and occasionally, took part in the discussions. He impressed me very much with his earnestness and zeal in educational matters, his extensive information and his advanced views on the subject. He was also well versed in natural science, especially in geology and mineralogy.

The Fredericton matter had interrupted the work of preparing my "Acadian Geology." On the completion of this, my expectation was, that

I might be enabled to pursue a more detailed examination of the geology of the line of country to be traversed by the projected Intercolonial Railway. Many delays and political changes intervened, however, and in the meantime, without my knowledge, events were shaping themselves which led to my removal from Nova Scotia, and which gave me work of a different character.

CHAPTER VI

EDINBURGH AND McGILL

In 1854, Edward Forbes, one of the finest minds engaged in the study of natural science in Great Britain, and destined apparently to take the lead of all others in solving the difficult questions which lie on the confines of biology and geology,—the Gordian knot, afterwards attempted to be cut rather than untied by Darwin and Huxley,—was removed by death from the professorship of Natural History in Edinburgh, to which he had been appointed only the year before. The question of a successor was one of much interest to scientific men generally, and as the chair embraced both geology and zoology, it naturally became a question which of these would be dominant in the choice, especially as there were very few men so well versed in both as Forbes had been. Lyell wrote to me at once on the subject, advising me, as an old Edinburgh student and a representative of the geological side, as well as a student of zoology, to become

a candidate. He also offered his support and that of other men of influence. The opportunity was not one to be hastily rejected. Edinburgh was to me a second home, and it had been the early home of my wife. I knew many of its scientific and educational men, and there was a great opening for a school of practical natural science in connection with the University. There were, too, splendid opportunities of working up the fossil fauna and flora of some portions of the Scottish coal-fields, and one might hope to give a great stimulus to the study of natural science in the University, where much of one's own early training had been obtained.

I therefore offered myself as a candidate, and wrote to friends in Edinburgh, while strong letters of commendation were sent in by my London friends. The British Association was to meet in Glasgow in the following summer, while my "Acadian Geology" was to be published in Edinburgh before that time; so, as I was advised that no appointment was likely to be made until a later date, I determined to attend the meeting, and at the same time personally to press my candidature. I had gone to Halifax, to take my passage for England by the Cunard steamer,

when a message arrived, to the effect that, contrary to expectation, the appointment had been hurried through in favour of Dr. Allman, who was the candidate of the Biological party, and more especially favoured by the medical professors. Then it was, that there occurred one of those coincidences, which impress us with the belief in a kind providence overruling our affairs. Almost simultaneously with the news of the failure of the Edinburgh candidature, a letter arrived in Pictou, from the Hon. Judge Day, the president of the Board of Governors of McGill University, Montreal, explaining the movement in progress for its improvement, and offering me the position of principal. I had made no application for this appointment, and knew little of McGill, except that it had some reputation as a medical school—whilst its academical faculty was in a comparatively undeveloped condition. Nor did I, at the time, know to whom I was indebted for suggesting my name. The office was a very different one from that in Edinburgh, involving much work of a purely educational kind, and likely to remove me further from my cherished work amongst the rocks of the coal period. It is not improbable that,

in other circumstances, it might have had little attraction. But the Edinburgh candidature had familiarised me with the idea of a change of habitation, and the arrangements necessary thereto had been made. I soon learned, also, that my friend Sir Edmund Head, who had been promoted to the office of Governor-General of Canada, desired that, if possible, I should go to Montreal. Accordingly, I transferred my passage to the next steamer, that I might consult my wife and father,—my mother having passed away some years before. It was finally decided to accept the Montreal offer, provided that a chair of natural history could be added to the principalship, which was readily agreed to. I was to go over to Scotland to attend the meeting of the British Association. My wife, with our three children, was to be ready, on my return, to go on with me to Montreal, and my father, when he could close up his business affairs, was to join us there. Thus, I went to Scotland, not as I had intended, as a candidate for the Edinburgh chair, but in an independent position, as the principal-elect of McGill University.

At the meeting of the British Association I renewed my acquaintance with many old

friends, and gained some that were new; especially the Duke of Argyll, that year President of the Association. With Professor Nicol, of Aberdeen, whom I had known as a student in Edinburgh, I enjoyed an excursion to the Isle of Arran, and discussed with him the views he was beginning to form, as to the structure of the older rocks of Scotland,—views at first regarded as very heterodox, but which have since been fully vindicated. After the meeting, I went up to London, and had much pleasant intercourse with Lyell, and other eminent men, and saw something of the educational and scientific work in progress there. Amongst other leaders in science, I met Sir Richard Owen, and took advantage of his advice in regard to the introduction of zoology as a branch of academical study. I was also able to note what he had done in this direction, in the Hunterian Museum; as I had previously seen and studied the small but excellent collection that Forbes had formed at Edinburgh. Zoology, I knew must be taught at Montreal, if in no other way, as an introduction to geology, and my previous knowledge was not so much structural, as classificatory, and in relation to the animals of that part of the world with which I was

familiar. An important matter, at this time, was the accumulation of books, specimens, and apparatus likely to be useful in McGill, but as I had only my own private means wherewith to make purchases, much that would have been of the utmost service had to be passed by. Nor was I, at the time, aware how very destitute McGill College was, both of specimens and of apparatus, for natural history work. It will be well perhaps to mention here that, once again, when the principalship of Edinburgh became vacant by the death of Sir David Brewster, in 1866, and before the establishment of the new chair of geology, I offered myself to Edinburgh for both of these offices, though without making any active canvass. I did not receive the appointment, but after a few years had at least the satisfaction of knowing that geology had secured, by a handsome endowment, an assured place in the curriculum of my Scottish *alma mater*.

In September 1855, I returned to Nova Scotia, and meeting my wife and our children at Halifax, as arranged, we proceeded, by way of Boston, to Montreal, which has since been our home. During the journey we became acquainted with Mrs. John Molson of Montreal, who gave us much information in regard to

what was before us in that city, and who has ever been a kind friend, whilst members of her family have been amongst the earliest benefactors of the University, next to McGill himself.

McGill University, founded by a wealthy merchant of Montreal, and endowed with University powers by Royal charter in 1821, had not for a long time fulfilled the anticipations of its founder and its friends. Up to 1852 it had, with the exception of the Medical School connected with it, been in a very languishing condition. At this time several public-spirited gentlemen of Montreal, perceiving that the McGill endowment was the nucleus of the educational interests of the English-speaking people of Lower Canada, determined, if possible, to revive the institution. They procured an amended charter, more elastic and less cumbrous than that originally granted, secured the appointment of an able and influential Board of Governors, and under their management, it had, after 1852, entered on a new career. But it still needed endowments and a working head. Vigorous efforts were being made to secure pecuniary aid, and inquiries were instituted by the President of the Board of Governors

for a principal, the office in the meantime being filled gratuitously by Dr. E. Meredith. The principalship should naturally have fallen to the vice-principal, the Rev. Dr. Leach, a man of ability and influence, who had for many years laboured, in the most disinterested manner, to sustain the work and credit of the University; but he was the incumbent of an important city charge, which he was unwilling to relinquish, and it was also very desirable that no aspect of denominationalism should be given to the University, and that, if possible, new men should be added to the staff. Dr. Leach himself cordially acquiesced to this, but for some time it proved impossible to secure the services of a man acceptable to all the members of the Board.

At this juncture Sir Edmund Head became Governor-General of Canada. He was known to be a man of high educational and literary gifts, a zealous university reformer, who had taken an active part in the Royal Commission for his own University of Oxford, and had done much for education as Governor of New Brunswick. He was also, under the new charter, ex-officio visitor of the University. The Governors of McGill, therefore, took an early opportunity of waiting on him to solicit

his aid and influence. Sir Edmund entered cordially into their plans, and on their mentioning to him their difficulty as to a principal, in the hope that he might be able to offer some advice, he, to their surprise, suggested my name. The members of the deputation listened respectfully; but I have been told by one of them that they were both startled and disappointed, as they had expected that Sir Edmund would have been able to indicate some man of mark in England, whilst my name was scarcely, if at all, known, and not likely to carry with it much prestige in Canada, which had at that time little in common with the maritime provinces. After due inquiry, however, it was decided to make me an offer of the appointment, which, as already stated, I happened at the moment to be in a position to accept, and on which I could enter with the more advantage, as a *protégé* of the new Governor-General—a fact which no doubt had its influence both with the Board of Governors and with the public.

It thus became my lot to devote such energies as I possessed, not to the formation of a school of natural science in my Scottish *alma mater*, but to the building up of a new

and poorly-endowed university in a province where the English minority has always had the utmost difficulty in sustaining its educational institutions and religious privileges. Yet, on this account, the position had its charms for a young man accustomed to hard work and to difficult undertakings.

The actual condition of affairs on my arrival in Montreal, and some of the earlier efforts made, and improvements set on foot, may perhaps best be described in the extracts which follow, from a lecture delivered in 1893, thirty-eight years after my appointment:—

"When I accepted the principalship of McGill I had not been in Montreal, and knew the college and the men connected with it only by reputation. I first saw it, in October 1855. Materially, it was represented by two blocks of unfinished and partly ruinous buildings, standing amid a wilderness of excavators' and masons' rubbish, overgrown with weeds and bushes. The grounds were unfenced, and pastured at will, by herds of cattle, which not only cropped the grass, but browsed on the shrubs, leaving unhurt only one great elm, which still stands as the 'founder's tree,' and a few old oaks and butternut trees, most

of which have had to give place to our new buildings. The only access from the town was by a circuitous and ungraded cart track, almost impassable at night. The buildings had been abandoned by the new Board, and the classes of the Faculty of Arts were held in the upper story of a brick building in the town, the lower part of which was occupied by the High School. I had been promised a residence, and this, I found, was to be a portion of one of the detached buildings aforesaid, the present east wing. It had been very imperfectly finished, was destitute of nearly every requisite of civilised life, and in front of it was a bank of rubbish and loose stones, with a swamp below, while the interior was in an indescribable state of dust and disrepair. Still, we felt that the governors had done the best they could in the circumstances, and we took possession as early as possible. As it was, however, we received many of the citizens, who were so kind as to call on us, in the midst of all the confusion of plastering, papering, painting, and cleaning. The residence was only a type of our difficulties and discouragements, and a not very favourable introduction to the work I had undertaken in Montreal.

"On the other hand, I found in the Board of Governors a body of able and earnest men, aware of the difficulties they had to encounter, fully impressed with the importance of the ends to be attained, and having sufficient culture and knowledge of the world to appreciate the best means for achieving their aims. They were greatly hampered by lack of means, but had that courage which enables risks to be run to secure important objects. I may mention here a few of these men. Judge Day was a man of acute legal mind, well educated and well read, a clear and persuasive speaker, wholly devoted to the interests of education, and especially to the introduction into the college course of studies in science and modern literature. Christopher Dunkin was a graduate of the University of London, educated first in Glasgow, and afterwards in University College, and had held a tutorial position in Harvard before he came to Canada. He had made college work and management a special study, and was quite competent to have been himself a college president or principal, had he not had before him the greater attractions of legal and political success. Hew Ramsay, was an admirable example of an educated Scotsman, of literary tastes and business

capacity. David Davidson was also a product of Scottish college training, and a warm and zealous friend of education, with great sagacity and sound judgment. James Ferrier should have been mentioned first. He was a member of the old Board of the Royal Institution, and senior member of the new, but voluntarily resigned the presidency in favour of Judge Day, in the interest, he believed, of the University. He was longer with us than any of the others, and no one could have been a more devoted worker in the cause of education. Such men as these, and their colleagues, insured public confidence, and a wise and enlightened management.

"The University at this time comprised three faculties—those of law, medicine, and arts. The faculty of Law, then recently organised, had two professors and two lecturers. The faculty of Medicine, the oldest and most prosperous of the three, had ten professors and a demonstrator. The faculty of Arts had four professors and a lecturer, and all of these, except one, gave only a part of their time to college work. They were, however, able and efficient men.

"Our great difficulty was lack of the sinews of war, and the seat of Government being,

at the time, in Toronto,[1] I was asked by the governors to spend my first Christmas vacation in that city, with a view of securing some legislative aid. There was as yet no direct railway communication between Montreal and Toronto, and of course no Victoria Bridge. I crossed the river in a canoe, amidst floating ice, and had to travel by way of Albany, Niagara, and Hamilton. The weather was stormy, and the roads blocked with snow, so that the journey to Toronto occupied five days, giving me a shorter time there than I had anticipated. I received, however, a warm welcome from Sir Edmund Head, saw most of the members of the Government, and obtained some information as to the Hon. Mr. Cartier's contemplated Superior Education Act —passed in the following year—which secured for the first time the status of the preparatory schools, whilst giving aid to the universities. I was also encouraged by Sir Edmund and Cartier to confer with the Superintendent of Education, and with the Governors of McGill on my return to Montreal, with reference to

[1] After the burning of the Parliament buildings at Montreal, and pending the selection of a permanent seat of Government, the Canadian Parliament met alternately in Quebec and Toronto.

the establishment of a Normal School in connection with the University. This was successfully carried through in the following year.

"The direct aid, however, which could be obtained from the Government, was small, and the next movement of the Board of Governors was our first appeal to the citizens of Montreal, resulting in the endowment of the Molson Chair of English Language and Literature with $20,000 (subsequently augmented to $40,000 by Mr. J. H. R. Molson), and $35,000 from other benefactors. This was a great help at the time, and the beginning of a stream of liberality, which has floated our university barque up to the present date.

"To counterbalance these successes and advantages, in the early part of 1856 the building occupied by the High School and by the Faculty of Arts was destroyed by fire, along with some of the few books that had been collected, and some of our apparatus, and a large part of my private collections, which I had been using for my lectures. The specimens, apparatus, and books were not insured, and the insurance on the building was quite insufficient to replace it, so that this was a great pecuniary loss, but one which our Governors bore with

admirable fortitude and equanimity, and took immediate steps to repair. For the remainder of the session the college classes were transferred, in part to the original college buildings, above Sherbrooke Street, and in part to the Medical Faculty's building, on Côté Street. The classes were not interrupted, and plans were at once prepared for the erection of a new and better building.

"At the same time, in the hope that the Faculty of Arts might be able before many years to occupy permanently the college buildings proper, the improvement of the grounds was begun by planting and making walks. At first I did this at my own cost, as a labour of love, merely asking permission of the Board. In connection with this the Hon. John Young, Major Campbell of St. Hilaire, and, at a later date, Mr. Charles Gibb, presented us with trees and shrubs, both native and exotic, so that a large number of species eventually came to be represented in the grounds.

"We had proposed, that, so soon as the students in arts should exceed fifty, we would venture to occupy the old buildings. This happened in 1860, and we accordingly pro-

ceeded to move up and take possession of the centre block, the east wing being used for residences. The movement was a fortunate one, for it suggested to our friend Mr. William Molson, the erection of a third block, corresponding to the eastern one, to be named the William Molson Hall, which was to contain the convocation room and library. This was the original limit of Mr. Molson's intention, but driving up one day in company with Mrs. Molson, to note the progress of the work, she suggested that it would be a pity to leave it unfinished, and that it would be well at once to connect the three blocks of buildings into one pile, according to the original plan. The hint was taken, plans were prepared, and one of the connecting buildings became our first museum, whilst the other provided a chemical and natural science room and laboratory. Both buildings, as well as the library, were seeds of greater things. The library was provided with shelves for 20,000 volumes, whilst we possessed less than 2000, and at first it was distressing to see its emptiness; but the time has long passed, when, after crowding with additional bookcases and extending it into an adjoining room, we began

to desire larger space, now happily supplied by the magnificent Peter Redpath Library. The museum, equally empty, received in the first instance a portion of my own collections, and others obtained in exchange and by purchase, from my own resources. In this way it was possible, almost from the first, to fill it respectably—for a museum without specimens is even more forlorn than a library without books. Dr. Carpenter's magnificent collection of shells was added in 1869. The whole furnished the nucleus for the Peter Redpath Museum, which stands at the head of Canadian educational museums. The other connecting building became the home of our chemistry and assaying, in which Dr. Harrington, with the aid for a time of the late Dr. Sterry Hunt, built up our schools of practical chemistry, and of mining and assaying, which have trained so many young men for useful chemical and manufacturing employment, for mining enterprises, and for the Geological Survey, and have sustained indirectly the honour course in geology in the Faculty of Arts. Thus, our resuming possession of the old buildings was successful, and fruitful of new enterprises, and Mr. Molson's timely aid laid

the foundation of greater successes in the following years.

"About this time, a number of our graduates resident in Montreal, formed themselves into the nucleus of a university society, which has continued to grow and expand up to the present time, and has still room for further extension, especially by the formation of branch or local associations, of which the Ottawa Valley Graduates' Society has set a first and brilliant example. One of the early efforts of this society was the institution of the 'Founder's Festival,' a social gathering on Mr. McGill's birthday. It was continued with spirit for some years, but failed to attract graduates from a distance, and was ultimately dropped in favour of other functions.

"In 1860 we entered on a new departure, by the affiliation of St. Francis College, Richmond; and this was followed in a year or two by Morrin College, Quebec. In this matter, both Judge Day, the president of the Board of Governors, and Judge Dunkin, were very earnest,—believing that these affiliated colleges might form important local centres of higher education and might give strength to the University. They have not, it is true,

grown in magnitude, as we had hoped, but so far they have maintained a useful existence, and have unquestionably done educational good; most certainly they have enabled some deserving and able men to obtain academical education, which would otherwise have been denied them. In the circumstances of the Protestant population of the province of Quebec, this is an end worthy of some sacrifice for its attainment. The only additional college of this class, is that of Stanstead, added at a comparatively recent date. In 1865, the Congregational College of British America, an institution for theological education only, was removed to Montreal, and became affiliated to the University; it has been followed by three other Theological Colleges (Presbyterian, Episcopal, and Wesleyan). The value of these to the University no one can doubt. They not only add to the number of our students in arts, but to their character and standing, and they enable the University to offer a high academical training to the candidates for the Christian ministry, in four leading denominations."

My work, during all the early years of my college life in Montreal, included about twenty lectures weekly, besides the care of the man-

agement and interests of the institution, and frequent efforts for its extension and enlargement. It was therefore impossible for me to do much in special or practical work with students. This had, in fact, to be limited to weekly excursions during the summer months, and in winter, to classes in mineral determination and the study of fossils. In all of this work, I had no assistance, except such as could be furnished by a few of the senior students themselves, and as the college was too impecunious to provide the necessary apparatus or specimens, it fell to my lot to do this also. Such little expenditures I did not grudge, so far as my means allowed, but I sometimes grieved over the necessary limitations of what I could do for those students who seemed interested in natural science, and often regretted that my own time and strength for original work were so very limited.

I had at first intended, in the long vacation, to make my headquarters in Montreal, and to do my field work from it as a centre, but we found that this was incompatible with the health of our children, and that it would be necessary to go, for a couple of months, at least, to some cooler place. I endeavoured, however, to make this work in with such

geological investigations as I might be carrying on, either in search of new facts, or in aid of my college work. In this way, our summer excursions were made to various resorts, in Nova Scotia, on the New England coast, in the White Mountains, and to places on the lower St. Lawrence River. For several years, in connection with work on the Pleistocene, it became expedient for me to spend much of my summer in the last-named locality, and finally, in 1875, we had a small summer cottage built at Little Métis. This place is in itself a healthy and desirable one, and formed a convenient half-way house between my home in Montreal and my former Acadian hunting grounds. It is near to both Pleistocene and Palæozoic deposits, and has good dredging ground in the vicinity, which affords interesting examples of varieties of molluscs, akin to those northern forms found in the Pleistocene clays. Here, in perfect quiet, with such members of our family as could join us, we have since spent many happy and profitable summers. Here, too, I have found time and opportunity to write most of my books and scientific papers, varying sedentary occupations with collecting expeditions, ranging from Quebec to the Bay of Chaleurs, and to Nova

Scotia. Our little cottage of "Birkenshaw," at Métis—embowered in trees, and overlooking the St. Lawrence estuary, here practically an open sea—is thus associated with some of the happiest, and I believe also the most useful, days of our married life.

With reference to social relations, my wife and I had determined to take our stand on the principles of total abstinence from alcoholic beverages. This was not merely in accordance with our own tastes and convictions, but was, in our view, a duty, which we owed to students who might look to us for an example, as well as to our own family. At first, this determination was not, I fancy, understood or appreciated in Montreal. In 1855, the old French and Scottish custom of New Year visits was in full force there, and our visitors were naturally numerous. To their surprise, instead of wine, invariably offered on these occasions, they were provided only with tea and coffee. It often happened, too, that at the various dinners and entertainments to which we were invited, we were the only guests present who did not take wine. This made us to a certain extent singular, at the time, but customs have very much changed since then.

As our residence afforded but limited space for gatherings on any large scale, scarcely a year passed that we did not give some entertainment in one of the college halls. In this way, we entertained the Evangelistical Alliance of Canada, on the occasion of their meeting in Montreal, and later, the American Association for the Advancement of Science, the Association of Protestant Teachers of the Province of Quebec, and many other public bodies.

As regards the students of the University, there was always a tacit understanding between them and myself, that, in addition to the hours devoted to lectures and to office duties, they were welcome, at any time, to visit me at my house, and this privilege was very frequently taken advantage of. Special invitations were, of course, given to such students as brought with them letters of introduction. Besides this, evening gatherings, at regular intervals during the session, were arranged, and cards of invitation for these sent to the different classes or years in rotation. At such gatherings there was usually music, sometimes a short recitation or address on some topic of interest, and scientific instruments, specimens and photo-

graphs were shown, simple refreshments provided, and every effort made to cause those who attended to feel thoroughly at home. As to the value of extending such hospitality to students, especially to those who may have come from distant homes, there can I think be no question; we have ourselves received very many pleasant testimonies of appreciation, both from students themselves and from their relations and friends. My only regret is that, owing to limited time and opportunity, it has not been possible to do much more on similar lines. In recent years, since the number of students in the several faculties has greatly increased, our example in this matter has been followed by some of the professors, as well as by a few of the citizens of Montreal, and it is my hope that such hospitalities to students may become a permanent and established custom.

It may be noted here, although it applies equally to the whole history of the University since the reorganisation of McGill, that there have been no serious breaches of discipline, no college emeutes or rebellions, and none of that cruel treatment of junior students, unfortunately common in some similar institutions. On the whole, there has been a commendable

spirit of loyalty towards the University, and much fellow-feeling and forbearance amongst the students themselves. This speaks well for the Canadian student; and I earnestly hope that no alteration or decadence will take place in these respects. Nothing conduces more to the success of the individual student, as well as to that of the University as a whole, than such a generous and friendly rivalry, in honourable and kindly conduct, as has in the main hitherto characterised the students of McGill.

CHAPTER VII

McGILL NORMAL SCHOOL

My last educational work in Nova Scotia, in 1854, had been in connection with the establishment of a Provincial Normal School. Amongst my first, in the Province of Quebec, was the inauguration of a similar institution in connection with McGill University. This might, at first sight, seem to be a chimerical undertaking for a nearly bankrupt institution, especially as some provision already existed for the training of teachers in connection with the school of the Colonial Church Society in Montreal. Our connection with this project occurred, however, in a manner which appeared to make it, in some measure, an outcome of our poverty itself. The only permanent resource of the University at this time was the disposal of the property of the McGill estate. It seemed desirable, in the public interest, that this should not be forced into the market, at a time when land in the outskirts of Montreal was of very small value, since, if

it could be retained until the growth of the city enhanced prices, it might become the source of a handsome income. To avert this necessity, application was made to the Government for temporary aid, and it was partly in connection with this that my long winter journey to Toronto, in the Christmas vacation of 1855, already referred to, was undertaken. I found but little encouragement to apply for direct aid for McGill, but the Governor-General, and the members of his Cabinet, were, on the whole, well disposed towards measures of general educational improvement for Lower Canada; and the Hon. Mr. Cartier (afterwards Sir George Cartier), the most influential statesman for that province, was preparing a bill for the advancement of superior education, especially in connection with the secondary schools, or academies, as they were called, which might become the means of supplying students to the University. Sir Edmund Head also directed my attention to an Act for the establishment of Normal Schools, giving the Government power to establish these under an Order-in-Council, but nothing had been done, owing to a little quiet opposition from a portion of the clergy, and to the apparent want of any public demand for such institutions. The suc-

cess of the school established by Dr. Ryerson in Upper Canada had attracted the attention of leading men in Lower Canada, and Mr. Cartier and Dr. Chauveau, (the Superintendent of Education), were understood to be favourable to the organisation of a similar institution there. Sir Edmund was very desirous that so important an improvement should be introduced, and thought that if McGill College, and its friends, would move in the matter, and offer their co-operation, something might be done, and that this would be indirectly beneficial to the University, by practically giving additional strength to its staff, and by training young men as teachers, who could prepare students for matriculation. At the same time it would place the University in direct connection with the higher schools of the English and Protestant population, and give unity and strength to that portion of the educational system which specially provided for their wants.

On returning to Montreal, I learned Dr. Chauveau's views, and discussed the matter with the Board of Governors. They appreciated its importance, and agreed to unite with the Superintendent of Education in convening a meeting of influential Protestant citizens to consider the subject. This meeting was held in

the office of the Hon. George Moffatt, and was unanimous in approving the plans proposed, which, as far as the circumstances permitted, were similar to those followed in the organisation of the Normal Schools, in Upper Canada and in Nova Scotia. The University, on its part, offered to affiliate one of the three Normal Schools which it was thought necessary to establish, and which was to be especially for the benefit of the Protestant population. Arrangements to this effect were entered into with Dr. Chauveau. The old High School building, on Belmont Street, then disused, was granted for the new institution, and put into repair. An arrangement was made with the Colonial School and Church Society to take over its work and its head-master, and, in 1857 the McGill Normal School was opened, and has ever since been an important lever for the elevation of English education in the Province of Quebec. It should be added here, that Dr. Ryerson kindly aided us with his advice as to the organisation of the school, and recommended to us one of his ablest and most promising instructors, Dr. S. P. Robbins, who has since become principal of the school, and a leader in our provincial education.

With the subsequent movements for the

higher education of women, the Normal School was also connected in several ways. It was necessarily mainly a school for women, as very few suitable young men were willing to enter on the profession of teaching, when so many avenues for more lucrative employment were open to them. Educationally the school has thus been a professional college for women, providing a thorough course, extending over three years (in the case of those who take its highest diploma), and qualifying for entrance into a calling which, more than any other, has opened a field of usefulness for educated women, and through them, has elevated the status of female teachers, and contributed greatly to the improvement and extension of the elementary school system. Its affiliation to the University has enabled its ablest students to take the University degree,—the highest grade of educational diploma,—and its trained teachers have gone out as educational missionaries into the country districts; whilst they have, at the same time, enabled a good and uniform system to be introduced at moderate cost into the city schools. The school has, in addition, furnished lady principals and special teachers to important colleges and higher schools for

women. It rendered easy, in this way, the establishment, by the Protestant Commissioners, of the Girls' High School of Montreal, which, while it raised the education of girls to a higher plane, also prepared many of them for entrance into the University. Fault has been found with myself, and with others connected with McGill College, in that, while adopting the system of mixed education in the Normal School, we insisted on separate classes for women at McGill. But our critics forget to consider the different conditions in the two cases. In the Normal School the women constitute the large majority, and, where this is the case, the difficulties of mixed education are greatly diminished. Besides this, teachers in training in a Normal School are subjected to strict rules of discipline, which would be impossible in the case of college students. Notwithstanding these advantages, however, we have not been without anxieties, which have necessitated a large infusion of trained and educated women in the staff of the school, and which, without any other information or experience, would deter me from advising mixed classes in an ordinary college.

I may here refer to a personal matter

which formed the only drawback to my satisfaction in being connected with the Normal School. It had not been proposed at first, that I should have any direct share in the work of the school, other than such general oversight as might belong to me as principal of the University. We had hoped to get as principal, an eminent and experienced educationalist, but it was found that his services could not be secured, and it became necessary for me to add to my already numerous duties the principalship of the school, and some lectures in natural science.

The sacrifice was in one respect great, for I had reckoned on the long vacation for original work, and this new employment required me to devote two extra months in each year to this institution. The result was, during several of the best years of my life, to reduce to about one-half my possible time for original research. The disappointment involved in this was, to some extent, diminished by my sense of the vital importance of the work of training teachers, and by the pleasure of teaching classes so earnest and attentive as those of the Normal School. It was also my first experience in the systematic teaching of natural history to classes

of women. As soon, however, as the school was fairly established, and my work could be provided for in other ways, I took the earliest opportunity of resigning this onerous position.

At an early period in the history of McGill, under its new management, it became apparent that better means must be provided for preparing students to enter the faculty of arts. The High School was sufficient, so far as Montreal was concerned, but the country high schools and academies were labouring under great difficulties, from want of adequate help and encouragement. Many of them also had their principals and masters from the New England states, to whose colleges they were naturally inclined to send their pupils. For this reason the University cordially supported the new Superior Education Act introduced by Cartier in 1856, and sought, by offering scholarships and free tuitions, to encourage deserving students from the country. We also co-operated with the Provincial Education Department, in the effort to introduce a uniform course of study leading to the University matriculation, and in stimulating the English population of the country to establish and maintain better

schools. Further, we did what we could to induce our own graduates to enter into the work of education.

These arrangements had special reference to the Protestant population of what is now the Province of Quebec. In the peculiar circumstances of this province, with its twofold population, and with but a small and scattered English-speaking community, this involved much care, labour, and tact; and in so far as any success was attained, much credit is due to two members of our board, viz., the Hon. Judge Day and the Hon. Judge Dunkin, both of whom well understood the condition and wants of education in the country districts, and were entirely free from the jealousies then existing between the English people of the "Eastern Townships," and those of Montreal. They also well knew, that we could scarcely hope to attract many students from other provinces, until we had obtained some fruit from the cultivation of our own more limited field.

Both were interested in the movement, about this time inaugurated in England, for university local examinations, and it became a question whether anything similar could be done in connection with McGill. The

field was very limited and the difficulties were great, so that even our friendly Visitor doubted if the time had arrived for such an attempt. The effort was made, however, and though for several years, the candidates were nearly all from the High School of Montreal, the sphere of influence of our examination for Associate in Arts was gradually extended; and now, with the co-operation of the sister university of Bishop's College, and of the Protestant Committee of the Council of Public Instruction, the examinations have become a provincial institution, and the aid and stimulus they have given to secondary education would be difficult to overestimate.

CHAPTER VIII

PUBLICATIONS AND RESEARCHES

My first geological paper, accepted and published by any society abroad, was that on the Lower Carboniferous Formation of Nova Scotia, communicated by Sir Charles Lyell to the Geological Society of London, and published in its *Quarterly Journal* in 1843. It was preceded by short communications in local prints, and by a description of the *Meriones*, or leaping field-mouse, of Nova Scotia, published in *Jameson's Edinburgh Journal* in 1842. These papers were followed by others, too numerous to be mentioned here, in various scientific transactions, proceedings, and periodicals. The whole, as recently catalogued by the Royal Society of London, up to 1884, exceed 150 in number.

My first venture in the publication of an independent book, was the little "Geography and Natural History of Nova Scotia," already mentioned;[1] the second was the "Contribu-

[1] Edinburgh and Pictou, 1848–52; and Halifax, 1852–57.

tions to the Improvement of Agriculture"; the third, and most important in some respects, was "Acadian Geology," the first edition of which was issued in Edinburgh in 1855. In it, I endeavoured to sum up in a popular form all my geological observations in Nova Scotia and the neighbouring provinces, constituting the "Acadia" of the early French explorers; the name, as explained in the book itself, being derived from the Micmac "cadie," and borrowed by the French, though without perhaps quite understanding its meaning.

My next literary effort was in a somewhat different sphere. I had long given some attention to the study of the Hebrew original of the narrative of creation, in the first chapter of Genesis, and to the references to it in succeeding portions of the Hebrew Scriptures; and my studies had convinced me that these documents admitted of a more full and worthy treatment than they ordinarily received from expositors of the Bible. In Pictou, no suitable means of publication were immediately available, but at this time an advertisement of the Burnett Prize for the best essay on this subject, appeared in Scottish journals, and I had my manuscript copied out and entered for competition. It was un-

successful, and was duly returned to me, and was in my possession when I went to Montreal in 1855. Here, I arranged to issue the work under the name, "Archaia, or Studies of the Narrative of Creation in the Hebrew Scriptures." It was published simultaneously in London, and was well received, though the sale was not so rapid as I had hoped for. I have, however, had many testimonies from different parts of the world, as to the good that it has done, in directing attention to this most remarkable part of Divine Revelation, and in clearing up the doubts of students. No second edition was called for; but the work having, after several years, gone out of print, and new discussions having arisen from the growth of the Darwinian theories of evolution, and the higher criticism, it was thought advisable, instead of issuing a second edition, to rewrite the work, and publish it under a new and more distinctive name, as "The Origin of the World,"—which has gone through several editions, and has been widely read on both sides of the Atlantic.[1]

When in London in 1870, my friend Mr. S. R. Pattison mentioned to me the wish of Dr. Macauley, the editor of the *Leisure*

[1] Sixth Edition, 1893.

Hour, to secure for that journal a series of articles on the geological history of the earth, free from the taint of agnosticism, which has affected so much of the popular writing on this subject. I undertook this, and endeavoured to give a broader and less local picture of the successive periods of the earth's history, than that usual in English popular works. These articles were afterwards collected into one volume under the title of "The Story of the Earth," and have so far had a larger circulation than any other of my popular writings, having now reached the eleventh edition. Its acceptance in the United States has been proved by the issue of two or three pirated editions, besides the legitimate one, issued by the Messrs. Harpers of New York.

These works led to later enterprises in the same direction, which may be grouped together here. In the winter of 1874–75, I was invited by the late Dr. Adams, president of the Union Theological Seminary of New York, to deliver a series of lectures, and I was asked to repeat these lectures at Princeton. These courses were short, for my only available time for such lectures was in the Christmas vacation; but I en-

joyed much pleasant intercourse with the eminent men connected with these institutions. The lectures were published by the Messrs. Carters, of New York, in a little book entitled, "Nature and the Bible," which I trust has done good service. A somewhat similar course, delivered some years later in Philadelphia, under the auspices of the Crozer Institute, also appeared under the name, "Facts and Fancies in Natural Science." Still later, I prepared for the Religious Tract Society of London a work, "Links in the Chain of Life," in which I endeavoured to trace a number of leading types of animals and plants from their introduction, and to show the remarkable persistence of organic forms through the lapse of geological time, in opposition to misleading statements as to the great instability of species, which have been so current among the leaders of the Darwinian evolution. Another popular effort, for the *Leisure Hour*, was, a series of articles on prehistoric man, based on discoveries at the site of the ancient village of Hochelaga,—where excavations for building purposes were being made about the time of my arrival in Montreal,—which revealed relics of great interest for comparison with

the remains of aboriginal men in other parts of the world. These papers were subsequently reproduced by Messrs. Hodder and Stoughton, of London, with the title of, "Fossil Men and their Modern Representatives."[1] This book is, in my judgment, one of the best I have written.

Some years after my arrival in Montreal, Logan showed me in his museum, certain laminated forms found in the lime rocks of the Laurentian system,—the oldest of the geological formations. No fossils had hitherto been found in these rocks, and it was the general opinion of geologists that, because of their great age and crystalline structure, they could not be expected to contain organic remains. Logan, however, argued that, as the specimens he had obtained, and others procured for him by Mr. Wilson of Perth, and Mr. Lowe, one of his field workers, were definite in form and structure, and similar to the layer-corals (*Stromatoporæ*) of the Siluro-Cambrian rocks, and that, as the mineral substances composing them were different in different specimens, while the forms were the same, the latter must be

[1] The title was original with me; the valuable "Homme Fossile" of Quatrefages was published later.

organic. As I had, ever since my student life in Edinburgh, been accustomed to study rocks microscopically, he was desirous that I should examine slices of the supposed fossils to ascertain if they showed any minute structures. I was willing to do so in a preliminary way, hoping afterwards to hand them over to Mr. E. Billings, then palæontologist of the Canadian Geological Survey; but in the end, Billings alleged that he was overwhelmed with other work, so it appeared that, unless I could undertake the examination of the slices prepared for Logan by Mr. T. C. Weston, they might be altogether neglected. At first, the specimens seemed to contain no minute organic structure, but at length, in 1864, some carefully selected examples procured from a new locality, showed canals and tubulation, not unlike that found in the shelly covering of the humble marine animals known as foraminifera. These creatures, though vastly abundant in the modern seas, are usually very small, but some fossil ones are of larger size, and it did not seem impossible that their predecessors in the very oldest rocks might have been of still greater dimensions, so that the size of our supposed Laurentian fossils, some of

which were several inches in diameter, might prove to be no objection to their animal origin. Enlarged drawings were prepared by a skilful artist, then in the service of the Survey, who was instructed to represent simply what he could see, without reference to any theory as to its nature; and these drawings were supplemented by micro-photographs.

When the descriptions and drawings were complete, and Dr. Sterry Hunt had worked up, and reported on, the chemical nature and probable origin of the several minerals concerned, Logan wrote a paper, accompanied by maps and sections, on the character and relations of the beds. The generic name, *Eozoon*, was given to the supposed fossil, which was thus to appear as an animal of the early dawn of life, but not necessarily as the first of animals. Although its case seemed to be well made out, it was felt that we would have to deal with a sceptical world, and with a host of scientific specialists, incompetent of appreciating the evidence, except in so far as it related to their own particular pursuits. For this reason, as Logan was about to proceed to England, I advised him to place all our notes and material in the

hands of Dr. W. B. Carpenter, whose admirable figures and descriptions, (and some slices he had kindly furnished me with,) had been our chief means of reference in studying the specimens. He was also, if possible, to consult Professor Rupert Jones, another great authority on foraminifera. On my part, I authorised him to defer entirely to the opinions of these gentlemen as to any criticism of theirs on the microscopic work that had been done, or amendment of the description or name of the supposed fossil, provided they were willing to take the responsibility. It was in this manner that *Eozoon* was finally laid before the Geological Society of London.

As might have been expected, the supposed discovery, although on the whole well received, was greatly misunderstood and misrepresented, even by some who were disposed to accept its reality. It was, too, assailed from various quarters, with as much bitterness as if this old fossil had been a personal enemy, and it soon became evident that not only the general public, but even specialists, whether in minerals, rocks, or fossils, required more detailed information than that as yet furnished. Carpenter and Rupert

Jones attended to this duty in some English periodicals, and I prepared a semi-popular treatise, "The Dawn of Life,"[1] which gave simple explanations and illustrations, and to which Logan contributed a beautiful geological map of those Laurentian districts in which the best specimens had been found. This little work was extensively read, but the publisher not venturing on a second edition, it soon fell out of print. For this reason, and because of new discoveries, indicating the presence of remains of life in formations intervening between the Laurentian and the Cambrian, it has since been necessary to restate the facts in various forms. The evidence has been summarised in one of the Peter Redpath Museum memoirs, also in two chapters of my work, "Salient Points in the Science of the Earth."[2] In 1896, in connection more particularly with the discoveries of Matthew Walcott and Cayeux, which seemed to bridge over the great gap between the life of the Cambrian and of the Laurentian, I delivered, by invitation of Mr. Augustus Lowell, a course of six lectures in the Lowell Institute, Boston, on the earliest forms of life. These lectures have

[1] Montreal, 1888.

[2] Hodder & Stoughton, 1893.

been published as a separate work, with the title, "Relics of Primeval Life." In this, the facts representing *Eozoon* are stated in a popular form.

On my removal to Montreal in 1855, whilst I still hoped to continue researches in Nova Scotia in the summer vacations, it seemed desirable to take up some subject of investigation nearer my new home, and my attention was attracted to the superficial clays and sands near Montreal, and elsewhere in the St. Lawrence valley, which had been noticed by Bayfield and Lyell, but not studied in detail. The shells in these were, in many cases, the same as recent species known to me in the Gulf of St. Lawrence, and the deposits in which they occurred were evidently continuations of the boulder formation, and its allied beds, which I had studied in Nova Scotia. No one on the Geological Survey was at the time working at these deposits. Hence arose a series of papers in the *Canadian Naturalist*, afterwards reprinted as "Notes on the Post-pliocene of Canada," (1870). I had previously given my notes on the fossiliferous deposits to Logan for his "Geology of Canada," (1863), though he

could only publish them very imperfectly in that work.

Between 1856 and 1870, I had examined the coast deposits of some parts of New England, and in 1861 spent some time in the White Mountains, especially on Mount Washington. I also made use of a visit to Europe, in 1865, to question the glaciers of Mont Blanc, and the icebergs of Belle Isle strait, as to what they could say on the glacial deposits of Canada. Advantage was taken, too, of my annual visits to the sea-coast to dredge in the lower St. Lawrence, at Murray Bay, Métis, and Gaspé; and in this way, while our collections in McGill college were enriched, I was able to recognise in the colder waters of the Canadian coast, nearly every species found in the Pleistocene clays. Mr. J. F. Whiteaves of the Geological Survey, and the late Mr. J. Gwynn Jeffreys, aided in this work, and the foraminifera and other minute forms were described in the *Canadian Naturalist* by my son, Dr. G. M. Dawson. The results of the whole were finally embodied in "The Ice Age in Canada," published in London and Montreal in 1894, which is my latest, and I trust my last, publication on this subject.

In these same years, I several times revisited Nova Scotia, and re-examined the Joggins section for remains of land animals, many additional species of which were discovered and communicated to the Geological Society of London. I also printed in the *Canadian Naturalist* a series of more popular papers on the same subject, with illustrative figures from my own drawings. These papers were issued as a separate work in 1863. A little later, I was enabled, by a small grant from the research fund of the Royal Society, to continue and extend my excavations, and to exhume many reptiliferous trees. The material obtained from these is described in a memoir in the transactions of that society for 1882. The story of these discoveries is given in my "Salient Points in the Science of the Earth," and need not be repeated here.

My geological work in Nova Scotia began, as stated in a previous chapter, with the collecting of fossil plants, and these have always been my favourite objects of study; and my collections, deposited in the Peter Redpath Museum, are richer in this than in any other department. In any list of my published papers it will be found that very

many relate to subjects of this kind, and the Carboniferous and Devonian floras of Canada I have especially desired to make my own.

I have mentioned Logan's discoveries of fossil plants in the Devonian of Gaspé, made as early as 1843, the account of which, when he visited Pictou in that year, greatly interested me. Unfortunately, the greater part of his collections of that summer was lost by shipwreck, but when I became domiciled in Montreal he placed in my hands what remained, besides some additional specimens collected in the meantime. This proved so interesting, that I spent two summer vacations with some of my students, in exploring the coasts of Gaspé Bay, discovering several new forms and making large collections. My investigations were then extended to Perry, in Maine, to the Bay of Chaleurs and to St. John, New Brunswick, where very large and interesting collections had been made by Messrs. Matthew, Hart, and others. Professor Hall, of Albany, kindly gave me access to the Devonian plants from his collections, in the State of New York, and Dr. Newberry allowed me to study specimens from Ohio, while several collectors

in different parts of the United States placed numerous specimens in my hands. I was also enabled to examine the collections of Peach from the Devonian of Scotland, and those of the Geological Survey of England obtained in Devonshire.

The result was, to more than double the known flora of that early period, and to show that the Devonian admitted of subdivision into three stages, of lower, middle, and upper, each distinguishable by characteristic fossil plants, as well as by animal remains. Some preliminary notices of these discoveries appeared from time to time in the *Canadian Naturalist*, and in the *Journal of the Geological Society of London*, but they seemed deserving of more full description and illustration. Accordingly, after correspondence with the secretaries of the Royal Society of London, I visited England in 1870, taking with me a large part of my collections, including duplicates of new and important species, for distribution to museums and to societies in Great Britain and on the Continent of Europe. I also had with me all my notes on the specimens and their localities, and a series of excellent drawings prepared under my own directions. The

specimens were exhibited at the annual soirée of the Society, and were made the subject of the Bakerian lecture of the year, as well as of a popular lecture at the Royal Institution ; but, to my great disappointment, the council of the Society declined to publish my paper and illustrations, thereby losing the credit of giving to the world the largest contribution made in our time to the flora of the period before the Carboniferous age. At the same time, a work which had cost me a large amount of time, labour, and expense, and which I had looked upon as my *magnum opus*, was not adequately published, and probably never will be. I was enabled, however, through the kindness of the Director of the Geological Survey of Canada, to publish a portion of the material as one of the Palæontological reports of the Survey. The more important results were also introduced into a course of lectures delivered in the Lowell Institute in Boston (1887), and afterwards published as a volume of the International Scientific Series under the title, "The Geological History of Plants." This, in some points, supplements the report above mentioned as having been prepared for the Geological Survey, and in

it, prominence is given to the immense development of the peculiar type of plants known as Rhizocarps, in the Lower Devonian, where this type seems to have had its culmination.

Before leaving this subject, it may be proper to mention that one distinctive object which I have steadily kept in view, is the discrimination of the relative dates of the several floras and sub-floras, in order to make fossil plants, as far as possible, a criterion of geological age. In this I think I have succeeded, to a large extent, in the Devonian and Carboniferous of Canada, and also, to some extent, in the Cretaceous and Tertiary formations of the West. I have spared neither labour nor expense in extracting, as far as possible, from the containing beds, all the parts of each species, so as to restore it in its integrity. Errors have no doubt been inevitable in the study of plants so peculiar, and so different from those of modern times, as are the plants of the Silurian and Devonian,—often, too, fragmentary and poorly preserved. Wherever I have detected such errors in my earlier papers, I have endeavoured to correct them in later publications, though I believe they are not numerous considering the amount of the mate-

rial studied. In connection with the later reports on the Devonian flora above referred to,—and to define more particularly the difference between the plants of the Upper Devonian and those of the lower part of the Carboniferous,—I added a report on the plants of the Lower Carboniferous and Millstone Grit, for comparison with the older flora. This also appears in the publications of the Geological Survey, and is summarised in "The Geological History of Plants."

Since my engagement in academical work, I have felt that, for the most part, practical investigations of mineral deposits and public surveys were out of my reach. In the summer of 1871, however, I was induced to spend a few weeks in a geological reconnaissance of the province of Prince Edward Island (in which I was interested in connection with new additions to my Acadian Geology), and was assisted by Dr. B. J. Harrington. The report prepared on this occasion was published, and though we could scarcely encourage the hope, entertained by some of the people of the Island, that coal would be found at an accessible depth, we succeeded to some extent in the difficult work of separating the Permian or Permo-Carboniferous beds, from those of

Triassic age, overlying them, and mainly made up of their débris. Since 1871, a local geologist, the late Mr. Bain, has succeeded in finding Permian plants in new localities, and in restricting the area of the Triassic beds, which, nevertheless, are of considerable extent, and have afforded Dinosaurian reptiles, and plants of types later than the Permian. I may refer to the latest edition of "Acadian Geology" for further particulars on these points.

Publications arising from travels in Egypt and Palestine, will be noticed under another head. Much desultory work, relating to specimens and facts which have had to be attended to in the midst of other duties, gave rise to papers in different periodical publications, which it would not be profitable to notice otherwise than in a mere list. The same remark applies to the few text-books I have been able to produce, principally for my own classes, and adapted to the wants of Canada. Numerous popular lectures, on scientific and other subjects, have formed a part of my work from the first, until brought to a close by failure of voice and of strength, but I cannot attempt to record them here.

In such a subject as geology, it is difficult to avoid uncertain and disputed questions, and as

to these, people in general, and also specialists, are apt to accept by preference statements which are bold and extreme, rather than those which are more moderate. Experience teaches that such extremes are usually somewhat remote from the actual facts. I have therefore striven, on such points, to follow a quiet middle course, which, however unattractive to the sensation-loving public, is most likely in the end to be correct. I have endeavoured to assume this attitude, not only on many minor questions, but on such general doctrines as uniformity and the cataclysmic question, in relation to the glacial period, on Darwinian evolution, and on the relations of the Bible to Science.

CHAPTER IX

VISITS TO ENGLAND IN 1865 AND 1870

In 1865 I revisited England with my daughter, (now Mrs. Harrington), and enjoyed for the first time the great pleasure of a short tour on the continent of Europe. On our way to Paris we spent a day at Amiens, to see that ancient city, and the gravels of the Somme, then exciting much attention as affording evidences of prehistoric man. We collected some of the flint "haches" found there, noting their mode of occurrence, and relation to the gravels of manifest post-glacial age, and the absence of any good evidence of the excessive antiquity at that time attributed to them by some writers. This view has since been generally abandoned, though I then stood almost alone in the matter, and even had to differ from my friend Lyell on the subject, which he however took very good-naturedly. We had time also to examine the old historic cathedral, and were witnesses of a grand procession and celebration on the part of the clergy of the diocese, one feature of which

was an eloquent sermon on the degeneracy and shortcomings of the time, which might have been made even more emphatic had it been delivered a few years later, when the empire of Louis Napoleon had fallen.

Proceeding to Paris, we devoted a few days to its various sights, not forgetting the works of art in the Louvre, and the vast collections in the museum of the Jardin des Plantes. We then made our way south, geological map in hand, to Dijon, and thence over the Jura to Geneva, where we had our first view of the snow-capped range of Mont Blanc, near to which we were to spend some pleasant days. The road to Chamonix is full of wonderful surprises in mountain scenery and geological structure. On arriving at that place, we made it our headquarters for excursions to the Mer de Glace, the Bossons, the Argentiére glacier, and the Flagére, which commands so fine a view of the group of Mont Blanc and its surrounding peaks. I was specially anxious to judge for myself as to the motion, and the erosive power of the glaciers, and the nature of their moraine matter. I saw no reason to doubt the gravitation and viscosity theory of Forbes, but, on comparing the polishing action of the glaciers with the erosion caused by the

mountain torrents, became a confirmed sceptic as to the erosive action of glaciers, more especially as the material in their moraines is so manifestly derived from the subaerial decay and frost action on the sides of their valleys. In like manner, the finer material carried off by the glacier streams is the result of the grinding of the earthy and stony matter thrown into the ice from above. The glacier is thus a mill, and its rocky floor is the nether millstone, which is in most cases protected rather than eroded by the overlying ice. The carrying power of the glacier is undoubtedly great, within its range, but it is altogether inferior to that of sea-borne ice, whether in the form of ice-fields grinding on the shores, or of the icebergs, detached from glaciers which terminate in the sea. These views, arrived at and published in 1865, I have ever since consistently maintained, in their application to the glacial phenomena of the northern hemisphere, and especially to those of Canada.

At and near Chamonix, I was naturally much impressed with the remarkable evidences of the folding and overturn of rocks, with the altered condition of the Carboniferous shales and the Cretaceous greensands, and with the evidence of enormous uplifts and

denudation since the Cretaceous age,—phenomena equally manifest in our Canadian Rocky Mountains, although at the time this had not yet been made known. From Chamonix, we passed to Martigny, by the Tête-noir Pass, collecting, by the way, in the hard mountain slates, fossil plants of the same genera, and some of them of the same species, as those in the coalfields of Nova Scotia, and comparing the modern alpine vegetation with that of the American mountains. I walked from Chamonix to Martigny in order to observe more closely the features of this most interesting section. Our course from Martigny was down the beautiful Rhine, across to Brussels, and thence back to England, in time to attend the meeting of the British Association, in the busy and public-spirited city of Birmingham.

At the Birmingham meeting of 1865, Professor John Phillips of Oxford, one of the founders of the Association, was the president, and the subject of geology was especially well represented. Murchison, the president of the geological section, and Lyell, vice-president, were acknowledged heads of English geological science, and they were supported by a host of able and eminent men. As a worker from beyond the seas, I was made one of the

vice-presidents of the section. Twenty years after, in 1886, I had the further honour of occupying the presidential chair of the Association in the same city. Before going to Birmingham, I spent a few days in Edinburgh, and was present at the annual convocation of the University, travelling thence with Sir David Brewster, then principal of the University of Edinburgh, and other Scottish friends, who were going to the Birmingham meeting. From notes made at this time, I may copy some portions referring to my impressions of the meeting:—

"At a luncheon given to the members by the Mayor of Birmingham, Sir Roderick Murchison, who called himself one of the 'Palæozoic members,' alluded to the origin of the Association, stating,—'that when, in 1831, he was president of the Geological Society of London, his young friend, John Phillips of York, with whom and his distinguished uncle, he had previously worked along the coast of Yorkshire, wrote to him in London, asking him to promulgate a suggestion which he had sent up for consideration. He endeavoured, to the best of his ability, to carry out the wishes of his friend, but what was the result? He could get scarcely anybody to hear of the

matter, when he first laid it before them, and he could get none to accompany him save his friend, Mr. Greenhow, of the Geological Society, and the late Mr. John Taylor. But though London did not respond, Manchester answered to the call, and sent that most eminent philosopher, Dalton; Ireland sent the Provost of Trinity, Dr. Lloyd; and Scotland was represented by Brewster, and by Professor Forbes, the eminent mathematician. Cambridge was not represented, but from Oxford came Dr. Daubeny with an invitation to the Association to meet there in the following year. Next year they met under Buckland, at Oxford, and they had with them the most eminent scientific men of the day.'

"Since that time the Association has grown to be one of the great institutions of England. Peripatetic, and without local habitation, essentially free and easy in its management, loose in its regulations, and democratic in its character, it is the most popular of British scientific societies. Its meetings attract thousands of auditors, and its influence, by the wide circulation given to its proceedings through the press, is felt throughout all parts of the British Empire.

"The British Association is by no means to be viewed as a scene of scientific dissipa-

tion. Nor must its utility be regarded as confined merely to the diffusion of popular information, though this is no small or despicable part of its work. It has important uses to the cultivators of science themselves. It drags them out of their dens, and brings them face to face with each other, and with the world. It gives scope for free and open interchange of ideas and arguments. It makes those who have attained to high positions, acquainted with the humbler workers in their several spheres. It gives the younger men opportunities of coming forward into notice. It throws those who are the oracles of little coteries at home, into the wider competition of the world. It enables scientific men in general, better to appreciate the work of each other, and to form more accurate notions of the powers, and mode of thought, of fellow labourers. It affords excellent opportunities for bringing out new facts and discoveries, under circumstances which give the means of testing their real value, and (if they pass this ordeal) of giving them general currency.

"To a student of science, whose ordinary sphere of labour is at a distance from the great centres of scientific work, and who can but rarely have conference with men engaged in

the same pursuits with himself, these meetings are particularly valuable, and their value is enhanced by the rarity of the opportunities for enjoying them. In our day the aspects of science rapidly change, and the student who depends for his information regarding them on books and on scientific journals has, after all, but a faint impression of the newer phases of scientific inquiry.

"On attending the meeting of the British Association at Birmingham in 1865, after a lapse of ten years, I had forcibly presented to my mind many changes in men and things. Some of the older men had passed away, or were disabled by age and infirmity from active labour. Those who were young and little known had attained to maturity of years and an established reputation. A host of younger men had risen up! In those departments of science, in which I am more especially interested, many new discoveries had been made, or new theories broached. The striking and prolific doctrine of the correlation of forces had been worked out. The method of spectrum-analysis had been devised, enabling us to obtain a knowledge of the chemical composition even of distant heavenly bodies. The hypothesis of the indefinite variation of species had

been revived, and had rapidly become popular among the younger scientific men. The later Tertiary deposits had yielded evidences of the possible existence of man in the time of the extinct mammoth, while the oldest rocks, before esteemed azoic, had afforded traces of animal life. In physics, in chemistry, in geology, and in natural history a multitude of new and important facts, filling great volumes of proceedings and transactions, had been discovered and given to the world. Thus every department of science might be said to occupy a new standpoint in 1865, as compared with 1855, when I had last been present at a meeting of the Association.

"On the other hand, to an observer in 1865, it seemed as if the age of geological giants, only culminating in 1855, was passing away, to be succeeded by less able men. This has often been the case in the history of science. One generation produces a crop of good men, the next, perhaps, a multitude of useful, but not brilliant or distinguished followers. It is quite apparent that such men as Lyell, Murchison, Sedgwick, Phillips, and Owen, who were aged men in 1865, have no equal successors in their special departments of science in England."

After the meeting we spent a most pleasant day with Phillips and his able colleagues, Dr. Acland and Professor Rolleston, at Oxford, in studying the admirable arrangements in the new museum and scientific library of that University,—institutions which are now, thanks to these eminent men and their colleagues, second to none in England, in facilities for the study of physical and natural science. In all that relates to the arrangement of specimens for study, and in affording due facilities to the student, Professor Phillips is as careful and enthusiastic as in his original investigations, and I can imagine no man better suited to cultivate scientific enthusiasm among students, and to send out from the old University educated naturalists for the next generation.

A little supplementary episode to this visit to the old world was a course of public lectures, delivered on my return to Montreal, in the interests of the Young Men's Christian Association. One of these was on "The British Association in the Black Country," and another on the "Glaciers of Mont Blanc, and the Icebergs of Belle Isle." The Young Men's Association was at that time in financial straits, and these lectures contributed, among other things, to form a turning-point in its affairs.

In connection with this visit to England, I have to note the great kindness and hospitality of my friend Dr. Bigsby, a true man of science, an earnest Christian, and full of a genial spirit, which endeared him to young and old. In addition to his kindness to me when I visited London, he was for many years one of my most valued correspondents, sending me notes of scientific gossip, and of minor events not chronicled in public prints, copies of new memoirs, and papers likely to be of interest, as well as wise advice regarding the propriety or expediency of taking part in discussions, or replying to criticisms. Dr. Bigsby had, many years before, been a member of the Boundary Survey between Canada and the United States, and knew much of Canadian geology, on which he had written several important papers, being in reality one of the principal pioneers of that science in British North America. He continued to the last to have a deep interest in Canada and its scientific development.

The year 1870 took me again to Britain, this time in company with my wife. My business on this occasion was partly educational, in connection with the Higher Education of Women, to be noticed in the sequel,

and partly that referred to in a previous chapter, arising out of my researches in the Devonian flora. Another object was to see our eldest son, who had entered the Royal School of Mines. Our friends in London had received him with much kindness, but his health had been delicate, and we wished to see for ourselves how he had got through the work of the session. We arrived in London at the end of April, remained there two months, and had the satisfaction of knowing that our son had passed through his first year in health and with credit. I have already referred to the lectures given at this time before the Royal Society and the Royal Institution. I had again the pleasure of spending a short time at Oxford, in company with Mr. Peter Redpath, and of seeing there Dr. Hatch, Dr. Acland, Mr. Prestwich, and others. We visited Cambridge also, especially to learn what was being done there in regard to the higher education of women, in which matter the new college of Girton had taken a leading part. I here met Sir Gabriel Stokes, Professor M'Kenney Hughes, and many other new and old friends, and learned much as to the educational movements in progress. At this time too, I owed a pleasant visit to the

Lias quarries of Street, in Somersetshire, and to the ruins of Glastonbury, to a commission for a friend in Montreal (Mr. T. J. Claxton), to purchase for our museum specimens of the fossil reptiles found at that place. He gave me a letter to Mr. Clarke, a leading manufacturer of Street, who entertained me hospitably, and whose son and daughter aided me in procuring what I desired.

We went from London to Edinburgh, and took up our summer quarters at Burntisland, on the Firth of Forth, renewing many old friendships in the Scottish metropolis, and learning of the new discoveries made by the Geological Survey and by Mr. Peach. I paid, too, a short visit to Mr. David Milne Holme, at his country seat near Berwick, and enjoyed some pleasant excursions with him in its neighbourhood.

At Burntisland, I became acquainted with Mr. Grieve, a very successful collector of the fossils of the Carboniferous beds in that vicinity, and had the pleasure of introducing him to Dr. Williamson of Manchester, to whom I rightly judged that his well-preserved specimens of fossil-stems from the trappien ash of the King's Craig would be of service in his brilliant investigations of the microscopic struc-

ture of plants, then in process of publication by the Royal Society. In Edinburgh, we made the acquaintance of Miss Louisa Stevenson, the Honorary Secretary of the Ladies' Educational Association, and at her house met several ladies interested in the higher education of women, from whom we learned much that was likely to be of value in the work of this kind, which we contemplated establishing in Montreal.

I was under the necessity of returning early to prepare for college work, so left my wife and son in Scotland, crossed over to Belfast, thence to the Giant's Causeway, and joined the steamer at Londonderry. This was my only visit to Ireland, but it gave me a strong impression of the richness of the country, and the abundant moisture of its climate. At Belfast, I met the late Dr. Wyville Thomson, a most agreeable man, and an able zoologist, as well as a general naturalist of wide attainments. He was at that time surrounded with precious treasures of the deep sea, the result of his recent Atlantic dredgings, to many of which he introduced me for the first time. What I saw of his deep-sea sponges was of great service to me some years afterwards, when I became interested in the

extinct species of the Quebec group of Canada.

At Portrush I examined the baked Jurassic and Cretaceous beds, similar to those I had seen in the Alps; and while admiring, as every one must, the grand basaltic flows which are the remains of the Tertiary volcanoes of Antrim, was also able to see something of the lignite and plant-bearing igneous strata, included in the great ash beds. My knowledge of the locality of the so-called coal, included in the basaltic cliffs, and strong desire to examine it, astonished a celtic guide who accompanied me, and who assured me that the thing was of no interest, and difficult to reach. Before visiting the cliffs of Antrim, I had made microscopic studies of the indurated chalk overlaid by the basalt, from specimens from the Holmes collection in Montreal, and had used them to demonstrate to my classes the identity of the microscopic shells composing this hard limestone with those of the soft English chalk. It was not till some years afterwards, that I learned that this was only beginning to attract the attention of British geologists.

This was the last time I was to see many of my British scientific friends;—Lyell, Murchi-

son, Sedgwick, Phillips, Bigsby, Thomson, Owen, and many others were gone, and my old Edinburgh professors were represented only by their busts in the college library, when I returned some twelve years later. Such an interval makes sad havoc among those nearing the end of life's journey, and as we become old ourselves, we feel like the last survivors of a wreck, clinging to some frail support, and soon ourselves to disappear. The old, however, are soon replaced by younger men, and in 1883, I found a host of new workers, more of specialists, and to a large extent on new lines, but carrying forward, each in his own way, the progress of knowledge.

While we were on the sea, the news of the opening of the great Franco-Prussian war was cabled across the ocean. On reaching Quebec I remained there a day to call on my friend Dr. Chauveau, the Superintendent of Education. He was full of the news, and quite sure that in a few weeks we should hear of the triumphant entry of the Emperor Napoleon into Berlin. I told him that some good military authorities thought differently, but he could not believe anything else possible. This was the universal opinion of French Canadians at the time, and until the final

catastrophe of the Empire came, even the more educated could scarcely believe that there was any truth in the cabled despatches of German victories. In the following year, I found that many of the common people on the lower St. Lawrence, whom I met in my collecting expeditions, still believed that the Emperor had annihilated the Prussians. This is a curious illustration of the old saying, that "blood is thicker than water"; but it should be borne in mind that the French-Canadian press persisted in claiming victories for the Emperor Napoleon, who, ever since his invasion of Mexico, had been represented to the Roman Catholics of Canada and of the United States, as the champion and defender of the true religion, as opposed to Protestantism.

CHAPTER X

COLLEGE LIFE: AND THE PETER REDPATH MUSEUM

THE life chronicled in these pages may be roughly divided into three periods,—an early one of preparation and active exertion, a middle one more of routine and uniformity, and a later one, of culmination in some respects, and decadence in others. The first was a time of early growth, the second of comparative stability, and the last a ripening of fruit, and a sifting time of the grain from the chaff.

During the ten years following my return from England in 1870, the University outlived, for the most part, its earlier trials and struggles. Its revenues expanded considerably. The original buildings had been completed by the generosity of Mr. William Molson. The number of its students greatly increased, as did also its staff of instructors. Gold medals and scholarships were founded. The beginning of a museum was formed, and the library, although still small, was growing rapidly, by

donations and occasional purchases. A suitable building on the college grounds was provided for the medical faculty. A new faculty of Applied Science was active and prosperous, though as yet without any building of its own. The statutes and regulations had become fixed and settled, and the whole machinery of the institution was moving smoothly and regularly. It had in short reached a position in which it could challenge comparison with its sister institutions and rivals, and which to many seemed adequate to all the requirements of the time. Still, there were many wants unsupplied, and constant difficulty was experienced in meeting the demands made upon us, from our limited resources, whilst many promising fields of usefulness had to remain uncultivated. In addresses, at the opening of the session in 1880 and in following years, I directed attention to a number of desiderata still existing, some of which are not yet fully supplied. On the whole, the ten preceding years had been characterised by steady, if slow, advance, achieved by much toil and many sacrifices.

On returning in 1870 and beginning the work of the session, one of the first cares of my wife and myself, was to attempt the organi-

sation of an association for the higher education of women, on the plan of that of Edinburgh. This proved successful, and continued a most useful work for fourteen years, till the University was enabled by the benefaction of Sir Donald Smith (now Lord Strathcona) to undertake the work.

I should also note that in 1871, and again in 1881, considerable public subscriptions were raised for the University. In securing these, we were greatly indebted to the late Mr. R. A. Ramsay, a member of the Board of Governors, and its honorary treasurer. In 1871, Sir William E. Logan endowed the chair of geology and palæontology, which bears his name, and in 1873, the John Frothingham chair of mental and moral philosophy was endowed by Miss Louisa Frothingham (now Mrs. J. H. R. Molson) in memory of her father. At this time, also, came the educational changes consequent on the federation of the provinces, and the efforts made to gain adequate guarantees for the Protestant minority in Quebec, in which the University, and its preparatory schools and affiliated colleges, were deeply interested. We made efforts to obtain for the University degree in arts, the legal value hitherto denied to it in the Province of Quebec, and to maintain the

interests of our medical and law faculties, under the new conditions. Much time and thought were necessarily occupied by these movements, though we had the aid of many zealous and influential friends.

To this period belongs the writing of several new books, and the revision of others for new editions—some already referred to. Among them the following may be mentioned: the second, and greatly enlarged, edition of "Acadian Geology"; a geological report on Prince Edward Island, by Dr. Harrington and myself; hand-books of Zoology and Geology for my college classes; "Notes on the Pleistocene of Canada"; "The Origin of the World, according to Revelation and Science"; and "Fossil Men and their Modern Representatives," with many papers contributed to scientific societies and journals, especially that one already mentioned, on the land animals of the coal formation, contributed to the Royal Society of London. In 1879 I delivered, by invitation, the annual Phi Beta Kappa oration at Harvard University, before a large and distinguished audience, including His Excellency the Earl of Dufferin, the Governor-General of Canada. The oration was afterwards published in the *Princeton*

Review, under the title of "The Rights and Duties of Science."

In 1880, I had been twenty-five years in McGill, and invitations were issued to the graduates of the University, to a celebration on the occasion, at the annual meeting of convocation, in April of that year. Three hundred and fifty guests were present, and letters of apology were received from as many more. Reporters were not admitted, the invitation being a private one, but the following account of the proceedings was circulated amongst the invited guests, after the entertainment ;—

"The guests assembled in the library, and were marshalled to the hall, in order of university rank and of date of graduation, and when all were seated the scene was a memorable one. Grace having been said by the Right Rev. Dr. Bond, the Bishop of Montreal, and sufficient time having been allowed for partaking of the refreshments provided, Dr. Dawson addressed some words of welcome to his guests. The usual toasts were then duly honoured, including that of the Lieutenant-Governor, who responded very cordially, and addresses were delivered by the representatives of the different bodies and interests connected with the University, and by

representatives of sister institutions. The speakers were naturally chiefly concerned with the past history and present state of the University, and the part which its Governors, Principal and Fellows, its Benefactors and its Graduates, had taken in elevating it to its present condition, and in advancing the interests of education. As to the future, the evening was signalised by the announcement of the intention of Mr. Peter Redpath, one of the Governors, to erect a costly and capacious museum building on the college grounds, and of that of the Principal to place therein, as a gift to the University, his own large geological collections; and the further announcement that the graduates proposed to commemorate the twenty-fifth year of the Principal's tenure of office, by the creation of a university fund, for the erection of a university building to bear his name.

"The speakers on points more directly relating to McGill, were, the Hon. Judge Day, the Chancellor, Mr. Peter Redpath, the Hon. Judge Dunkin, Dr. E. T. Meredith, Dr. Campbell, Prof. Trenholme, Dr. Johnson, Prof. Bovey, Mr. R. A. Ramsay, Dr. Chamberlain, Hon. Dr. Church, and Hon. Mr. Lynch. The addresses of these gentlemen

were replete with reminiscences of the olden times, new to many of the younger auditors, as well as with auguries and projects for the future.

"Of the graduates, nearly one hundred came from different parts of Canada and the United States to be present at the entertainment, while hundreds of others, unable to leave their homes, sent letters breathing a spirit of warm affection for their *alma mater.* Among those present, there were many who had attained to high positions in public and professional life; thus, the Lieutenant-Governor, Dr. Robitaille, is a medical graduate of 1858; the Hon. Mr. Lynch, his Solicitor-General, is a Bachelor of Civil Law and Gold Medallist of 1868; the Hon. Dr. Church, late Treasurer of the Province, and President of the Graduates' Society, is a medical graduate of 1857. A large number of other names might be mentioned, of men who, in public and professional life—as ministers of religion, members of parliament, professors and lecturers in McGill College, and other institutes of higher learning, eminent physicians and lawyers, or workers in practical science and literature—have already made their mark and taken high positions.

"Besides those more immediately connected

with McGill, there were present the Rev. Dr. Cook, the Rev. Dr. MacVicar, the Rev. Dr. Wilkes, and the Rev. Canon Henderson, as Principals of four of the affiliated colleges. The University of Bishops' College was represented by its Principal, the Rev. Dr. Lobley. Laval University was represented by the Hon. Dr. Chauveau, and the University of Toronto by Dr. Wilson. All of these gentlemen spoke in terms of friendly greeting on behalf of their respective colleges and universities."

The Peter Redpath Museum, of McGill University, marks the culmination of a series of efforts in the direction of establishing, in Montreal, an active and living centre of study and research in natural science. One of my first inquiries as to McGill, on my arrival in Montreal, had reference to any collections that the University might possess. The Secretary, to whom the question was addressed, informed me that there was no museum, but produced from a pigeon-hole in his desk a fragment of a common Trenton limestone coral of the genus *Morticulipera*, and informed me that this was the only specimen possessed by the University—but of its history he knew nothing. I asked him

to hand it over to me as the nucleus of a college collection, and it still remains in its proper place in our collection of fossils. Many of my own specimens perished in the fire, which destroyed Burnside Hall, in 1856, so that for the next session, I had to depend largely on the collections of the Geological Survey, and the Natural History Society, for the illustration of my lectures; and in addition to this I could occasionally visit these museums with classes of students.

When a new building was erected, for the joint accommodation of the Faculty of Arts and of the High School, a few cases were placed in one of the rooms, which served also for a library and for my office, and there our museum was begun. I put in them all that was suitable of the remains of my private collection, and gathered diligently in the summer vacations, using the duplicates obtained for exchanges, in the interests of the college museum. After a time, the Governors were able to purchase the valuable collection of minerals made by the late Dr. Holmes, and with these, he presented to the University his herbarium, at that time one of the largest in Canada, which was arranged and catalogued for class use by

Dr. Barnston, who, until his death a few years later, was the lecturer on Botany. When the original college buildings were completed in 1862, by Mr. Molson, and when the classes were removed to them, a suitable room was provided for a museum. At this time also, Mr. William Molson added to his larger gifts a certain sum, as the nucleus of a museum fund, which was supplemented by the fees due to me for lectures attended by the classes of medical students, and by occasional gifts from other friends, especially the late Mr. J. H. R. Molson. Unfortunately, the idea of a permanent endowment, contemplated by Mr. William Molson, was not followed up.

The late Dr. Philip P. Carpenter, who had made his home in Montreal, became one of the largest benefactors to the museum, by presenting to it his invaluable collection of shells, on certain conditions as to its preservation and arrangement,—the scientific portion of which he attended to himself. He thus gave us not only the specimens, but what was of even more value, the determination of the species and varietal forms, in which respect this collection still remains of unique importance to the student of recent

and fossil mollusca, and has been consulted by many eminent workers from abroad.

It had from the first been kept in view, as essential to an academical museum, that we should carefully classify our collections, and expose them in such a manner as to be really useful to students,—that we should in zoology, mineralogy, and botany, represent in the first instance the typical forms, and give to others, as far as possible, a representation in proportion to their importance in the system of nature. In geology, it was the aim to represent every period by its characteristic rocks and fossils, and to arrange the latter in such a manner that the student could either occupy himself with the fauna and flora of a given period, or could trace any group of animals or plants through the whole course of its existence in time, taking special note of its first known appearance and final decline and extinction. Throughout the whole, preference was given to Canadian examples, where available; and in some departments special Canadian collections were provided. The material accumulated on these principles was, before 1880, too much for our available space, and it was becoming imperative to relegate

the portions least necessary to be on view, to drawers and packing-cases, whilst I had to keep my working collections in my own residence.

I had about this time received a tempting offer of employment in the United States, which would have improved my income, and given me greater scope for original work. The inducements were strong, both in my own interests and in those of my family, but I disliked the idea of leaving my own country and allegiance, and of abandoning a work which seemed so necessary in Canada, and especially in the Province of Quebec. I mentioned the matter to my friend Mr. Peter Redpath, in whose judgment I had much confidence, referring more particularly to an impression, growing in my mind at the time, that my connection with McGill for so long a period, might have so far exhausted my power and influence for good, as to make removal to a new field desirable. Mr. Redpath dissuaded me from entertaining the idea of removal, and stated that he believed new and larger benefactions were in store for McGill, and that he himself contemplated, at no distant date, the erection of a museum, and possibly of a library, in regard to which

he reckoned on my aid. His attention was particularly directed to the museum in the meantime, because of the overcrowded state of our present rooms, and of the intended removal, by Government, of the Geological Survey Museum, which had heretofore been of so much service to Montreal and to McGill. Thus originated the Peter Redpath Museum, the greatest gift ever made by a Canadian to the cause of natural science, and up to this time, the noblest building dedicated to that end in the Dominion. I have already stated that Mr. Redpath announced his gift at the banquet of 1880, and the plans of the building having been matured, its erection was immediately commenced, whilst I, with the aid of some of my natural science graduates, and the best special assistance that could be secured, spent the whole summer vacation in the preparation of the specimens for removal to their new home.

In the spring of 1881, when the basement of the building had already made good progress, the corner-stone was laid by the Governor-General, the Marquis of Lorne, and we succeeded in having the specimens transferred to the building, and laid out in the cases, in time for the meeting of the American

Association for the Advancement of Science, in the autumn of 1882. The museum was formally opened at an entertainment given by me, as president of the Association for the year. After the formal conveyance to the University by the founder, addresses were delivered by the Hon. Justice Day, Chancellor of the University; by Dr. W. B. Carpenter of London; and by Dr. James Hall of Albany, all of whom expressed their high appreciation of the scientific and educational value of the museum and its contents. In the session opening immediately after the meeting of the Association, the museum and its class-rooms were fully in use for the teaching of geology, mineralogy, zoology, and botany.

When our collections were finally transferred to the new museum, I was surprised and gratified to find to how great an extent they realised my idea of an equable representation of all departments of natural history, with typical examples of the objects in each, necessary to the student. It is true there were some gaps, and we left these unfilled till the appropriate material could be procured. There would have been more imperfection, but for donations called forth by

the occasion. The most notable of these was one of $4000 from the heirs of Sir William Logan, to form a collection in his memory. Sir William, when head of the Geological Survey of Canada, was obliged by the parsimony of the Government, to procure many expensive books and instruments at his own cost, but made it a condition, that, should the collections be removed from Montreal or dispersed, these outlays should be reimbursed. His heirs claimed this sum of money, when the museum was removed to the new seat of Government at Ottawa, and as one of Sir William's executors, I, of course, did what I could to sustain their just claim. When the matter was arranged finally, though only a portion of the amount claimed was actually paid, the heirs showed their appreciation of his preference for Montreal, by the handsome donation above mentioned to the museum of the University. To secure the end in view, as fully as possible, Mr. James Richardson, one of Sir William's valued assistants in field work, who had in the meantime retired from the Survey, was employed to revisit some of the more important localities from which collections had been made, so that many Canadian examples, previously accessible only

in the Survey museum, might be duplicated in that of the University. Richardson's work also led to new discoveries in the fossils of the Quebec group, and to the recognition of the equivalency of beds on the lower St. Lawrence with the Tremadoc formation of England. Curious additional facts were further obtained, as to the fossils and impressions in the Potsdam sandstone. Some of these facts were communicated to the Natural History Society of Montreal, others were published in the reports of the museum. These reports, annually appended to the report of the University to its Visitor, also show the growing usefulness of the museum, and its improvement during more recent years.

CHAPTER XI

ROYAL SOCIETY OF CANADA

In the summer of 1881, the Governor-General of Canada, the Marquis of Lorne, invited me to visit him in his apartments in the citadel of Quebec, with the object of consulting me in regard to a project for the organisation of a society, to be called the Royal Society of Canada. The idea was new to me, and evidently involved serious difficulties, besides no small labour on the part of those who might be entrusted with the arrangement of the details. I felt confident, however, that under the patronage of Lord Lorne, it would be successful, and that the scientific side, at least, of the proposed society would be strong from the first. Personally, I would have preferred to have had to do with a society wholly devoted to Natural Science, resembling in its plan the Royal Society of London, but Lord Lorne was desirous of making the basis of the society as comprehensive as possible, and especially of enlisting the French Canadian

element, which, though rich in cultivators of Literature and History, had given little attention to Natural and Physical Science. Local reasons also weighed in favour of giving it a popular and democratic character. Lord Lorne had already entered into correspondence with the president of the Royal Society and other eminent men in England, and was evidently prepared to give a cordial and efficient support to the undertaking. My own wide acquaintance with scientific and educational men in different parts of Canada, seemed to give me exceptional facilities, for at least the preliminary work, and I undertook, at the request of his Excellency, to preside over the first meeting of the society, stipulating, however, that my friend Dr. Chauveau should be associated with me as vice-president, as a representative of literature, and of the educated element in French Canada. Names were suggested of men suited to form a provisional council, and Dr. (now Sir John) Bourinot was invited to be honorary secretary.

Informal meetings were held, first at my residence in Montreal and afterwards at Government House in Ottawa. The general constitution of the society was provisionally

settled, and the men available for membership were corresponded with, and invited to attend the first meeting. The society was launched in Ottawa in May 1882. The labour devolving on myself, notwithstanding the able assistance of my confrères, and especially of the honorary secretary, Dr. Bourinot, was very great, and included the answering of a vast number of questions, and the solving of many difficulties. This was, however, more than compensated for, by witnessing the gathering of scientific and literary men at the first meeting, most of them known to me personally, but many previously unknown to each other, and yet all ready to co-operate cordially in the work proposed for the society.

The objects in view, and the duties and relations of the new society, may be best learned from the presidential address delivered in the Senate Chamber, at Ottawa, before His Excellency the Governor-General, who presided, the members of the new society, and a large number of ladies and gentlemen invited on the occasion. I think it the more necessary to insert this, as it marked, not only an important point in my own life, but also an event which must be regarded as

marking an epoch in Canadian science and literature, and one, with which, thanks to the kindness of Lord Lorne, and of my scientific and literary brethren, my name will be associated so long as the society endures.

The institution of this society should also have special mention in the history of the term of office of a Governor-General, who, in this movement, identified himself with the higher intellectual life of the Dominion of Canada, even more fully than any of the other able and eminent men, who had preceded him, as representing her Majesty in Canada.

The following is my address, delivered before the Royal Society of Canada in May 1882:—

"We meet to-day to inaugurate a new era in the progress of Canadian literature and science, by the foundation of a body akin to those great national societies which, in Great Britain and elsewhere, have borne so important a part in the advancement of science and letters. The idea of such a society for this country, may not be altogether new, but if broached at all, it has been abandoned, from the inability of its advocates to gather together from our widely

distributed provinces the elements necessary to its success. Now it presents itself under different and happier conditions. In the mother country, the reign of Queen Victoria, our gracious sovereign, has been specially marked by the patronage of every effort for the growth of education, literature, science, and art, not only on her part, but on that of the lamented Prince Consort, and of other members of the royal family. It is fitting, that here too, the representative of royalty should exert the same influence, and our present Governor-General has undoubtedly both a personal and an hereditary right to be the patron of progress and culture in literature and science. Since the political consolidation of the Canadian Dominion, improved means of intercourse have been welding together our formerly scattered provinces, and have caused much more intimate relations, than formerly, to subsist between men of letters and science.

"We are sometimes told that the enterprise in which we are engaged is premature, that like some tender plant too early exposed to the frosts of our Canadian spring, it will be nipped, and perish. But we must remember that, in a country situated as this

is, nearly everything is in some sense premature. It is with us a time of breaking up of ground, and of sowing and planting, not a time of reaping or gathering fruit, and unless this generation of Canadians is content, like those that have preceded it, to sow what others must reap in its full maturity, there will be little hope for our country. In Canada at present, whether in science, in literature, in art, or in education, we look around in vain for anything that is fully ripe. We see only the rudiments and beginnings of things, but if these are healthy and growing, we should regard them with hope, and should cherish and nurture them as the germs of greater things in the future. Yet, there is a charm in this very immaturity, and it brings with it great opportunities. We have the freedom and freshness of a youthful nationality. We can trace out new paths which must be followed by our successors; we have a right to plant, wherever we please, the trees under shade of which they will sit. The independence which we thus enjoy, and the freedom to originate which we can claim, are in themselves privileges, but privileges that carry with them great responsibilities.

"Allow me to present to you a few thoughts, bearing on this aspect of our position, and in doing so, to confine myself chiefly to the side of science, since my friend Dr. Chauveau, who is to follow me, is so much better able to lay such before you from a literary point of view. Young though our country is, we are already the heirs of the labours of many eminent workers in science, who have passed away, or have been removed from this country. In geology, the names of Bigsby, Bayfield, Baddeley, Logan, Lyell, Billings, Hector, and Isbister will occur to all who have studied the geological structure of Canada, and there are younger men like McOuat and Hartley—too early snatched away—who have left behind them valuable records of their labours. In botany and zoology we can point to Michaux, Pursh, Hooker, Shepherd, Bourgeau, Douglas, Menzies, Richardson, Lord, and Brunet. These are but a few of the more eminent labourers in the natural history of this country, without mentioning the many living workers who still remain. Were it the object of this society merely to collect, and reproduce, and bring up to date, what these older men have done, it would have no small

task before it. But to this we have to add the voluminous reports of the Geological Survey, and the numerous papers and other publications of the men who are still with us. In natural science, we thus have a large mass of accumulated capital on which to base our future operations, along with an unlimited scope for further efforts and researches.

"The older men among us know how much has been done within the lifetime of the present generation. When, as a young man, I began to look around for means of scientific education, there was no regular course of natural science in any of our colleges, though chemistry and physics were already taught in some of them. There were no collections in geology or natural history, except the private cabinets of a few zealous workers. The Geological Survey of Canada had not then been thought of. There were no special schools of practical science, no scientific libraries, no scientific publications, and scarcely any printed information accessible. In these circumstances, when I proposed to devote myself to geological pursuits, I had to go abroad for training, not equal to that which can now be obtained in many

of our Canadian colleges. Nor, at that time, were there public employments in this country to which a young geologist or naturalist could aspire. It is true this was more than forty years ago, but in looking back, it would seem but as yesterday, were not these years marked by the work that has been done, the mass of material accumulated, and the scientific institutions established within this time. Those who began their scientific work under such circumstances, may be excused for taking somewhat hopeful views as to the future.

"Perhaps at present, the danger is, that we may be content to remain in the position we have reached, without attempting anything further; and, however inconsistent this may be, it is easy to combine the fear that any movement in advance may be rash or premature, with the self-satisfied belief that we have already advanced so far, that little remains to be attained. We must bear in mind, however, that we have still much to do to place ourselves on a level with many other countries. With the exception of the somewhat meagre grants to the Geological Survey and to the Meteorological Service, the Government of Canada gives nothing in aid of scientific research. What

is done for scientific education by local societies must, under our system, be done by the separate provinces, and is necessarily unequal and imperfect. Few large endowments have been given for scientific purposes. We have had no national societies or associations comparable with those of other countries. Yet, we are looking forward to a great future. Wealth and population are moving rapidly onward, and the question is, whether culture of the higher grade shall keep pace with the headlong rush of material progress. Various elements may enter into the answer to this question, but undoubtedly the formation of such a society as this, is one of these, and of the utmost importance; and even though at the present time the project may fail of success, or be only partially effective, (of which, however, I have no apprehension), it must be renewed till finally enabled to firmly establish itself.

"Another consideration bearing on this question is the vastness of the territory which we possess, and for the scientific development of which, we have assumed the responsibility. Canada comprises one-half of the great North American continent, reaching for three thousand miles from east to west, and extending from south to north from the latitudes of 45°

and 49° to the Polar Sea. In this area, we have representatives of all the geological formations—from the Laurentian and Huronian, to which Canada has the honour of giving names, to the Post-pliocene and modern. Of some of these formations we have more magnificent developments than has any other country. In zoology, our land area extends from the land of the musk-ox in the north to that of the rattlesnake in the south, and we have perhaps the greatest area possessed by any country for the study of fresh-water animals. Our marine zoology includes that of the North Atlantic, the North Pacific, and of the Arctic Ocean. In botany, we have the floras of the Atlantic and Pacific slopes, of the western plains, and of the Arctic zone. In physical, astronomical, and meteorological investigations we have the advantage of vast area, and of varied climate and conditions. These circumstances in themselves imply responsibilities in connection with the progress of science, not here only, but throughout the world.

"Much is no doubt being done to cultivate these vast fields of research, and I would not for a moment underrate the efforts being made, and the arduous labours, perils, and privations to which the pioneers in these fields are even

now subjected; but what is being done is relatively insignificant. Many letters from abroad reach me every year, asking for information, or reference, as to Canadian workers in specialties, which no one here is studying; and I know that most of our active naturalists are continually driven by such demands, to take up lines of investigation, in addition to those already more than sufficient to occupy their time and energy. Were it not for the aid indirectly given us, by the magnificent and costly surveys and commissions of the United States, which freely invade Canadian territory, whenever they find any profitable ground that we are not occupying, we would be still more helpless in these respects. Is there not, in these circumstances, reason for combination of effort, and for the best possible arrangements for the distribution of our small force over the vast area which it has to maintain?

"I have dwelt sufficiently long on topics which indicate, that the time has fully come for the institution of the Royal Society of Canada. Let us turn for a moment, to the consideration of the ends which it may seek to attain, and the means for their attainment.

"I would place here first, the establishment of a bond of union between the scat-

tered workers, now widely separated in different parts of the Dominion. Our men of science are so few, and our country so extensive, that it is difficult to find in any one place, or within reasonable distance of each other, half-a-dozen active workers in science. There is thus great lack of sympathy and stimulus, and of the discussion and interchange of ideas, which tend so much to correct, as well as to encourage. The lonely worker finds his energies flag, and is drawn away by the pressure of more popular pursuits. Even if this society can meet but once a year, something may be done to remedy the evils of isolation.

"Again, means are lacking for the adequate publication of results. True, we have the reports of the Geological Survey, and transactions are published by some of the local societies, but the resources at the disposal of these bodies are altogether inadequate, and for anything extensive or costly we have to seek means of publication abroad. This can be secured only under special circumstances; and while in this way, the published results of Canadian science become so widely scattered as to be accessible with difficulty, much that would be of scientific value fails altogether of adequate publication, especially in

the matter of illustration. Thus, the Canadian naturalist is often obliged to be content with the publication of his work in an inferior style, and poorly illustrated, so that it has an aspect of inferiority to work really no better, which in the United States, or in the mother country, has the benefit of sumptuous publication and illustration. On this account, he has often the added mortification of finding his work overlooked or neglected; and not infrequently, whilst he is looking in vain for means of publication, the credit of that which he has attained by long and diligent labour, is taken away from him by its previous issue elsewhere. In this way, also, it very often happens that collectors who have amassed important material, of great scientific value, are induced to place it in the hands of specialists in other countries, who have at their command means of publication not possessed by equally competent men here. The injury which Canadian science, and the reputation of Canada, sustain in this way is well known to many who are present, and who have been personal sufferers.

"Should this society have sufficient means placed at its disposal to publish transactions, —I shall not say equal to those of the Royal

Society of London, or the Smithsonian Institute at Washington, but to those of such bodies as the Philadelphia Academy, or the Boston Society of Natural History,—an incalculable stimulus would be given to science in Canada, by promoting research, by securing to this country the credit of the work done in it, by collecting the information now widely scattered, and by enabling scientific men abroad to learn what is being done here. It is not intended that such means of publication should be limited to the work or papers of members of the society. In this respect it will constitute a judicial body, to decide as to what may deserve publication. Its transactions should be open to good papers from any source, and should thus enable the younger and less known men of science to add to their own reputation and to that of the country, and so to prepare the way for their admission to membership of this society.

"Few expenditures of public money are more profitable to the State than those which promote scientific publication. The actual researches made imply much individual labour and expense, no part of which falls on the public funds, and by the comparatively small cost of publication, the country gets the benefit

of the results obtained, its mental and industrial progress is stimulated, and it acquires reputation abroad. This is now so well understood, that in most countries, public aid is given to research as well as to publication. Here, we may be content, in the first instance, with the latter alone, but if the society is at first sustained by the Government, it may be hoped that, as in older countries, private benefactions and bequests will flow into it, so that eventually, it may be able, not merely to afford means of publication, but to extend substantial aid to young and struggling men of science who are following out, under difficulties, important investigations.

"In return for aid given to this society, the Government may also have the benefit of its advice, as a body of experts, in any case of need. The most insignificant natural agencies sometimes attain to national importance. A locust, a midge, or a parasitic fungus, may suddenly reduce to naught the calculations of a finance-minister. The great natural resources of the land, and of the sea, are alike under the control of laws known to science. We are occasionally called on to take our part in the observation of astronomical or atmospheric phenomena of world-

wide interest. In such cases, it is the practice of all civilised governments to have recourse to scientific advice, and in a society like this, our Government can command a body of men free from the distracting influence of private and local interests, and able to warn against the schemes of charlatans and pretenders.

"Another object which we should have in view, is that of concentrating the benefits of the several local societies scattered through the Dominion. Some of these are of long standing and have done much original work. The Literary and Historical Society of Quebec is, I believe, the oldest of these bodies, and its transactions include, not merely literature and history, but much that is of great value in natural science, while it has been more successful than any of our other societies in the accumulation of a library. The Natural History Society of Montreal, of which I have had the honour to be a member for twenty-seven years, is now in its fifty-third year. It has published seventeen volumes of proceedings, including probably a larger mass of original information respecting the natural history of Canada, than is to be found in any other publication. It has accumulated a valuable

museum, and has done much to popularise science. It has twice induced the American Association for the Advancement of Science to hold its meeting in Canada, and was the first body to propose the establishment of a Geological Survey. The Canadian Institute of Toronto, occupying the field of literature as well as of science, although a younger, has been a more vigorous society, and its transactions are equally voluminous and valuable. The Natural History Society of St. John, New Brunswick, though it has not published so much, has carried out some very important researches in local geology, which are known and valued throughout the world. The Nova Scotian Institute of Natural Science is a flourishing body, and publishes valuable transactions. The Institût Canadien of Quebec, and the Ottawa Natural History Society, are also very useful institutions. The new Natural History Society of Manitoba has entered on a vigorous and hopeful career. There are also, in the Dominion, some societies of great value, cultivating more restricted fields than those above referred to, and of a character rather special than local. As examples of these, I may mention the Entomological Society of Canada, the His-

toric Society, and the Numismatic Society of Montreal.

"Did I suppose that this society would interfere with the prosperity of such local bodies, I should be slow to favour its establishment. I believe, however, that the contrary effect will be produced. They are sustained by the subscriptions and donations of local members, and of the provincial legislatures, while this society must depend on the Dominion Parliament, from which they draw no aid. They will find abundant scope for their more frequent meetings in the contributions of local labourers, while this will collect and compare these, and publish such portions as may be of wider interest. This society will also, it is hoped, furnish means of publication for memoirs too bulky and expensive to appear in local transactions. There should, however, be a closer association than this. It is probable that nearly all of the local societies are already represented among our members, by gentlemen who can inform us as to their work and wishes. We should therefore be prepared at once to offer terms of friendly union. For this purpose, it would be well to give to each of them an associate membership for its president, and for one or two of its officers,

nominated by itself and approved by our council. Such representatives would be required to report to us, for our transactions, the authors and subjects of all their original papers, and would be empowered to transmit to us for publication such papers as might seem deserving of this, and make suggestions as to any subjects of research which might be developed by local investigation. The details of such association may, I think, readily be arranged on terms mutually advantageous, and conducive to the attainment of the objects we all have in view.

"It would be a mistake to suppose that this society should include all our literary and scientific men, or even all those of some local standing. It must consist of selected and representative men, who have themselves done original work, of at least Canadian celebrity. Beyond this it would have no resting-place short of that of a great popular assemblage, whose members would be characterised rather by mere receptivity, than by productiveness. In this sense it must be exclusive in its membership; but inclusive, in that it offers its benefits to all. It is somewhat surprising at first sight, and indicative of the crude state of public opinion on such matters, that we some-

times find it stated, that a society, so small in its membership, will prove too select and exclusive for such a country as this; or, find the suggestion thrown out, that the society should become a professional one by including the more eminent members of the learned professions. If we compare ourselves with other countries, I rather think the wonder is that so many names should have been proposed for membership of this society. Not to mention the strict limitations in this respect, placed on such societies in the mother country, and on the Continent of Europe, we have a more recent example in the National Academy of Sciences in the United States. That country is probably as democratic in its social and public institutions as Canada, and its scientific workers are certainly in the proportion of forty to one of ours. Yet the original members of the Academy were limited to fifty, and though subsequently the maximum was raised to 100, this number has not as yet been attained. Yet public opinion in the United States would not have tolerated a much wider selection, which would have descended to a lower grade of eminence, and so would have lowered the scientific prestige of the country.

"Science and literature are at once, among

the most democratic, and the most select, of the institutions of society. They throw themselves freely into the struggle of the world, recognise its social grades, submit to the criticism of all, and stand or fall by the vote of the majority, but they absolutely refuse to recognise, as entitled to places of importance, any but those who have earned their titles for themselves. Thus it happens, that the great scientific and literary societies must consist of few members, even in the oldest and most populous countries, while, on the other hand, their benefits are for all, and they diffuse knowledge through the medium of larger and more popular bodies, whose membership implies capacity for receiving information, though not for doing original work. The younger men of science and literature must be content to earn their admission into the higher ranks, but have, in the fact that such higher rank is accessible to them, an encouragement to persevere, and in the meantime may have all their worthy productions treated in precisely the same manner as are those of their seniors.

"Finally, we, who have been honoured with the invitation to be the original members of this society, have a great responsibility and a high duty laid upon us. We owe it to the

large and liberal scheme, conceived by His Excellency the Governor-General, to carry out this plan in the most perfect manner possible, not with regard to personal, party or class views, but to the great interests of Canada, and its reputation before the world. We should approve ourselves first, unselfish and zealous literary and scientific men, and next, Canadians, in that widest sense of the word, in which we shall desire, at any personal sacrifice, to promote the best interests of our country, and this, in connection with a pure and elevated literature and a true, profound and practical science.

"We aspire to a great name. The title of 'Royal Society,' which, with the consent of Her Gracious Majesty the Queen, we hope to assume, is one dignified in the mother country by a long line of distinguished men, who have been fellows of *its* Royal Society. The name may provoke comparisons not favourable to us, and, though we may hope to shelter ourselves from criticism by pleading the relatively new and crude condition of science and literature in this country, we must endeavour, with God's blessing on earnest and united effort, to produce, by our cultivation of the almost boundless resources of the country

which has fallen to us as our inheritance, works which shall entitle us, without fear of criticism, to take to ourselves worthily, and justly, this proud name of 'The Royal Society of Canada.'"

The Royal Society of Canada has continued its work since 1882, and has published annual volumes of its transactions, which, both in matter and form, reflect credit on the Dominion, and have done much to give it a place among those nations which cultivate science and literature for their own intrinsic value. The presidency is like that of the British Association, annual, but I have been able to attend nearly all the meetings as a member of council, and as a private member, and have also occupied the position of president of the section of Natural Science.

CHAPTER XII

MEETINGS OF THE AMERICAN AND BRITISH ASSOCIATIONS FOR THE ADVANCEMENT OF SCIENCE, 1882–86

On taking up my residence in Montreal in 1855, I had connected myself with the Natural History Society, the oldest scientific society in Canada, which has since done me the honour to elect me as its president no less than fifteen times, and, when age had obliged me to resign that office, gave me the title of Honorary President. The society already possessed a respectable collection, especially of Canadian zoology, and a small library of scientific books, and included in its membership nearly all the gentlemen in the city who were interested in natural science,—amongst whom were Sir William Logan, Mr. E. Billings, Dr. A. F. Holmes, Dr. Workman, Dr. Smallwood, and others of more than local repute. In 1856, the idea was suggested to the society, of inviting the American Association for the Advancement of Science to meet

in Montreal, and was warmly taken up by the members, who, though loyal subjects of the Empire, felt that science should not be limited by political boundaries. A deputation, of which I was a member, was sent to convey our invitation to the Association at its meeting in Albany, N.Y., it having been first ascertained that the city of Montreal, and McGill University, would join with us in the effort. Our invitation was accepted, and we prepared to welcome the Association on its first meeting on Canadian soil. We made an effort to secure, also, the presence of some representatives of science from the mother country, and although few of these were able to attend, we were so fortunate as to secure Professor Ramsay, afterwards the Director of the Geological Survey of Great Britain. The meeting was successful, being well attended by the members from the United States, and by a much larger number of Canadians than had previously taken part in the meetings of this Association. Many valuable papers were read, the most important being the address of Professor Hall, State Geologist of New York,—the retiring President,—in which he expounded his views on the building up of the sedimentary rocks and mountain chains

of eastern America. To Canada, and especially to Montreal, the meeting did much good. It directed the attention of scientific men in Great Britain and the United States to our resources, and to the scientific work in progress in British North America; it gave too, to our citizens, new ideas as to the value of scientific investigation, and as to the estimation in which our own scientific workers were held abroad. This meeting further rendered it easier to provide for the second and larger meeting of the Association in Montreal, in 1882.

It was on the occasion of this second meeting of the American Association in Montreal, that I had the pleasure, as president for the year, of inviting its members to a conversazione in connection with the opening of the new Peter Redpath Museum. The presence of Dr. William B. Carpenter, and of other Englishmen of scientific fame, at this meeting, the correspondence carried on by the Governor-General in connection with the organisation of the new Royal Society of Canada, and, later, the opening of this society under his auspices, led directly to the invitation given to the British Association, to meet in Montreal in 1884.

In the American Association it is customary or the retiring president of each year to deliver

his presidential address at the opening of the next meeting. It thus devolved on me, as president in 1882, to deliver an address at the meeting of 1883, which was to be held in Minneapolis. In connection with this, Dr. Sterry Hunt and I were commissioned to invite the members of the American Association, to attend the meeting of the British sister society, which we hoped was to be held in Montreal in 1884, and to ask that the American Association should so arrange its meeting for that year, as to give opportunity to our British guests to attend it. I meditated, too, an excursion to the Rocky Mountains before the Minneapolis meeting, so as to be able to state in England, from personal observation, what could be seen in a trip from Montreal to the west, and intended to return to Montreal in time to be in England for the meeting of the British Association in September. As my strength and energy needed recruiting, I had asked the Governors of the University for a year's leave of absence, intending to extend my former travels to the Mediterranean, Egypt, and Palestine. To this request they heartily acceded.

Leaving Montreal in July, with my friend Mr. J. H. R. Molson, we went westward by

way of Toronto and Collingwood, and thence by steamer to Port Arthur, (as the railway along the north shore of Lake Superior was not then opened). At Port Arthur, I made my first acquaintance with the grand trappean hills of Thunder Bay, and with the black slates of the Animikie group, which have some markings believed to be of organic origin, and, if so, contain the oldest fossils known in this region. Passing by rail over a rugged Laurentian and Huronian country, between Port Arthur and Rat Portage, we came out on extensive peat bogs, or "muskegs," and then on the great alluvial plain of the Red River. The bogs may be regarded as a modern reminder of the vast swamps in which the lignite of the Tertiary beds, farther west, was deposited. The Red River plain, constituting the most fertile part of the great agricultural province of Manitoba, is the dried-up bed of an ancient lake, now filled with the finest mud, which shows under the microscope that,—like the mud of the Nile,—it is largely composed of very minute crystalline grains derived from the waste of the old Laurentian rocks. Beyond the Red River valley, the rolling prairie of the second plateau, with its vast expanse of grassy turf, and its belts of yellow sun-

flowers, asters, and astragalus, its occasional farms and hastily extemporised villages, formed an entirely novel scene to me, and, though monotonous, was far from being uninteresting. The railway was then completed only as far as the Saskatchewan River, and here we stayed for a few days to visit the coal seams and sections on the banks of the river, and the country towards Ross Creek, where we saw the marine Cretaceous beds of the Pierre, with oysters and belemnites, and the coal-bearing beds of the Belly River series. Among other relics from the Cretaceous beds, we were so fortunate as to find a considerable portion of the skeleton of a large dinosaurian reptile, (genus *Diclonius* of Cope); and a little farther west, on the plains, we picked up the entire skeleton of a fine bull bison, which now represents this nearly extinct species in the Peter Redpath Museum.

We made our way as far west as Calgary, which we reached by driving twenty miles, and were much impressed by the systematic and rapid way in which the end of the railway was advancing westward. In Calgary we found a town in a very rudimentary state, its principal hotel being composed of boards and canvas, and floored with sawdust. Near there

I was able to collect some valuable fossil plants for our museum, from the shales and sandstones of the upper Laramie formation.

On our return eastward, we examined the fine series of moraine-like ridges, apparently old sea margins, with ice-borne boulders, which form the Missouri côteau.

When we reached Winnipeg, I parted from my friend, and proceeded at once to Minneapolis, where I arrived in good time for the meeting, and was hospitably entertained in this thriving and busy city of the West. My address on "Unsolved Problems in Geology," was duly read, and the arrangements for the meetings of the British and American Associations on successive weeks, in Montreal and Philadelphia, were provisionally decided on. The meeting was a successful one, and was attended by many leading American men of science, but was not so large as that of the preceding summer in Montreal. When it was over I returned at once to Montreal, and prepared for my voyage, with my wife and younger daughter, to England.

In Montreal a pleasant surprise awaited me. A number of friends had contributed the handsome sum of $5000, as a testimonial

to be presented to me and my wife, to facilitate our travels in the East. This gift testified, in a most agreeable manner, to the goodwill of my fellow-citizens, and to their appreciation of my work. I regarded it too, as a trust, to enable me to turn my visit to the best account, both in the matter of the proposed meeting of the British Association in Montreal, and as to anything I could do for the advancement of knowledge or the cause of science. If, in the publications and lectures to which it has led, my journey to the East has proved of any lasting benefit, it is but fair that the credit should be fully shared with these kind and liberal friends.

The presentation was made at a meeting held in the board room of the Molson's Bank, the spokesman on behalf of the subscribers being Sir Francis Hincks. In my reply, allusion was made to the early history and progress of McGill University, and to the position of the city of Montreal, at the time, concluding as follows:—

"Everywhere the reputation and influence of Montreal have been extended by its educational action, and it is largely due to this, that, when the British Association decided to meet in Canada, it was tacitly conceded

that Montreal was the only Canadian city prepared adequately to entertain this great scientific body. Another point on which we have a right to congratulate ourselves, in this connection, is the unanimity which has characterised our whole movement. Men of all politics, of all denominations, of all nationalities, have been banded together in this work, and it is something to boast of that no unpleasant controversy, no strife or division, has broken our harmony, and that, while fierce disputes on educational matters have raged elsewhere, we have had here the unity and brotherhood, which are as the dew of heaven in relation to great movements of this kind. I may mention, as an illustration of this harmony, that, since my connection with the University, I have not known any matter decided by a vote of our board of Governors. In every case, subjects on which there was any difference of opinion, have been patiently discussed and examined, until some harmonious decision could be arrived at.

"There are, I confess, some matters connected with our history, which have given cause for apprehension or regret. One of these is the necessity, which has been put upon the University, of alienating so much

of its landed property at an early period of its work. This was not part of the original plan. It was hoped that the Legislature, acting in the public interest, would have aided the Governors to husband the McGill endowment, so that it might attain its maximum value, but these hopes were not realised, and property which would now have enriched the University, had to be parted with in its early struggles. Still the city has received the benefit of this, and has more than repaid us for the loss. It has been a matter of sorrow to me that we have been able to do so little directly, for the education of the working class, and of the citizens generally, more especially in science. We have, however, done much indirectly, through other bodies, and through our school of applied science; and I shall hope in my visit to the mother country, to study some of the new science colleges, established in its cities, with the view of ascertaining whether more cannot be done here, in this direction. Nor am I satisfied with what we have yet done, with reference to the education of women. We have, I think, done more than any other Canadian university, through the Ladies' Educational Association, through our Normal

School, which is practically a college for women, and through the opening of our examinations to women, but we have not done enough. The direction of further advancement, may depend much on the means placed at our disposal, but we are now endeavouring to inform ourselves as to the most successful agencies at work elsewhere, and I hope to do something towards this also, during the coming winter.

"In our circumstances it is inevitable that our progress should be by fits and starts, and somewhat unequal, thus lacking that majestic uniformity, which we see in Nature, and which we would fain imitate. Where all is so incomplete, and where nearly every change for the better depends on some individual benefaction, we must be content to advance step by step, and to find that each step places some part of our work in an attitude of undue development compared with the rest. Our friends must bear with us in this, and should know that we are aware of our weak points, and most anxious to have them strengthened, and that even the oldest universities in the world retain some portion of this one-sidedness, each having some specialty for which it is noted beyond others,

and some points where it is relatively deficient.

"You are familiar, gentlemen, with the fact that the position of Montreal makes it an object of jealousy to some of its sister cities, and subjects it to some disabilities and disadvantages. If the great water highway of the northern half of our continent is to be improved, it is held to be the special business of Montreal to attend to this, though the benefits may affect the whole country westward of it,—even the western and north-western States, as well as western Canada. If anything is to be done, in any part of Canada, from the endowment of a college to the purchase of a bell for a village church, the collector invariably comes with his book to Montreal, while no one thinks, that any charities or institutions in this city, however wide their benefits, have any claim on the liberality of those beyond its limits. If any public improvement or any change in financial measures is contemplated, the first question asked is:—'Will not this in some way, direct or indirect, minister to the overgrown wealth of Montreal?' and, if the question can be answered in the affirmative, the scheme is likely to be unpopular. On the contrary, if

duties are to be levied, or taxes imposed, to relieve the general or provincial exchequer, the most profitable harvest is to be reaped from the business community of this city.

"Notwithstanding, Montreal prospers in spite of all, and, no doubt, it is for this very reason that it excites some envy.

"I wish, however, to say to you that the same feeling applies to our educational interests. While Montreal is expected to be a liberal contributor to educational interests elsewhere, it need not reckon on any aid from without, and finds many institutions, desirous of obtaining for themselves some share of its local advantages by various devices, sometimes not quite in accordance with strict justice, or educational comity. Much of the local educational legislation has the tendency, no doubt quite unintentional, to direct students from a great educational centre like this. I do not complain of this. It is the natural penalty of greatness, which always implies perpetual vigilance, but I mention it to you, with the view of asking, that the same watchful care, which you know so well how to exercise in reference to our commercial interests, may be exercised also with regard to those which are educational. But over

all these struggles, God reigns, and with His aid, and unanimity amongst ourselves, we shall be able to sustain and enlarge those great and growing institutions, which originated with the benefaction of James McGill, and which, fostered by your own wisdom and liberality, have conferred such great benefits on the whole of this country, and have contributed so materially to the greatness and dignity of this Queen City of the St. Lawrence Valley.

"I thank you most sincerely on my own behalf and on that of my wife, and shall retain the memory of your kindness while life remains. It will be truly a pleasure to devote your liberal gift to the purposes you have indicated, and I trust it will, (with God's blessing), aid in the fulfilment of my cherished wish, that I may return, better fitted than heretofore, to advance those interests of good education, which we all have so much at heart."

Before leaving for England, the notes of my western tour, (though containing little more than a summary of the facts in the report of Dr. G. M. Dawson, on the Geology of the Forty-ninth Parallel, published some years before), were thrown into the form of a short paper on the geology and physical geography

of the North-west, for the benefit of such members of the British Association as might propose to visit Canada in 1884. This paper was communicated to the Geological Society of London, and widely circulated among the members of the geological section of the Association.

The preliminary arrangements for the meeting of the British Association in Montreal had at this time already been completed. Committees had been organised, and grants in aid had been secured from the Dominion Government and from the city. On March 19th, 1883, a circular had been addressed by the Council of the Association to all the members, conveying needful information, and requesting a statement of their intention to be present at Montreal, or otherwise. In reply to this circular, the Council was able to report, that nearly 500 members had stated their wish to go to Montreal, including 150 members of the General Committee. A large proportion of the leading scientific members had also signified their wish to attend the meeting. The details had been arranged in such a manner, that the proposal was ready to be brought forward for final action at the approaching meeting in September 1883, which took place

at Southport, and, as might have been expected, was largely attended, and full of interest. My wife and I went early, and did our best on all occasions, to place the projected Montreal meeting in a favourable light, both with the General Committee, and with the individual members. We had to answer all manner of questions, many intelligent and to the purpose, but some of them put by persons who professed to believe, that the climate of Montreal was an alternation of intolerable heat with arctic cold, and that they might expect to suffer from either, and possibly from both of these extremes, during their stay. Before the matter came up for final decision by the General Committee, Sir Charles Tupper, High Commissioner for Canada, came down from London, with his able and energetic secretary, Mr. Colmer, and took part in the discussion. The result was, that the decision to meet in Montreal was carried unanimously, and with enthusiasm. There still remained, after the meeting, some work to be done in London, in settling details to the satisfaction of Professor Bonney, the General Secretary of the Association, who, like a wise general, was determined to provide beforehand for every contingency of this distant campaign.

All this being satisfactorily arranged, my wife, my daughter and I left England in October for Egypt.

My primary object was to rest and recruit, but this end was to be secured, not so much by absolute repose, as by change of scene and of occupation. We were, therefore, to see and to learn as much as possible of those old lands, which have fired the imagination of every reader of history. In previous studies of the relations of nature to the Bible, it had appeared to me that too little was known of the bearing of the geology and topography of Bible lands on such questions. Everything, from the site of Eden, as described in Genesis, to the scenery of St. John's visions in Patmos, appeared to admit of additional illustration from nature. Further information as to the relations of prehistoric man to the early history of the East, was also much to be desired. I had armed myself with many notes and queries on these subjects, had studied collections existing in England and North America, and was desirous, on my way to the East, and in returning from it, to learn as much as possible of the discoveries relating to early man in Europe, and to apply these to eastern and biblical questions.

In our progress through Europe, therefore, we first visited Paris, and paid our respects to the celebrated prehistoric man of the cave of Mentone, who now reposes in the great museum of the Jardin des Plantes. The curator had the kindness to remove the glass covering so that I could examine the bones closely, though under the disadvantage of a temperature lower, I trust, than any this ancient man had been subjected to, when in the flesh. Doubts have been entertained as to his "palæolithic" age, but to me it appeared certain that he belongs to no modern race, but was a veritable antediluvian of the mammoth age; and I find that later discoveries in these caves tend to confirm this conclusion. We also spent some time in the study of the magnificent collection formed by Mortillet, in the old palace of St. Germain, which ranges through the whole history of man's existence in France, from that of the earliest antediluvian tribes, to the Roman period. Leaving Paris, we saw at Lyons collections from the Solutré, and at Florence those from the valley of the Arno. At Rome, we looked into the geological structure of that remarkable site, and examined, in so far as time permitted, the Christian catacombs, which are so intimately

connected with biblical history. I was especially interested in the catacomb of Achilles and Nereus, which is more in its original state than is that of Calixtus, usually shown to travellers. We waited a short time at Naples, in order to obtain news of the cholera in Egypt, and the quarantine in Syria, and of course visited Pompeii, and the specimens collected from it and from Herculaneum, which have thrown so much light on the domestic life of the Romans, and which also so curiously illustrate the possibility of the fossilisation, in modern times, of man and his companion animals. We ascended Mount Vesuvius, and observed the form and behaviour of this interesting modern volcano, built up, as it has been, to a height of 4000 feet by ejections, beginning in the year 79 of the Christian era, and therefore one of the most recent of mountains.

The reports as to cholera being favourable, we took passage from Naples to Alexandria. In Alexandria and Cairo, we found ourselves already in that magical east, which retains to-day so much of the garb and form of old historic times. In the rich and well-arranged museum at Boulac, (since removed to better quarters), and in ascending the Nile as far as Philae, I obtained some acquaintance with the

geology of the Nile valley, and with its superficial deposits and oldest human remains, which, so far as can yet be positively known, are probably all post-diluvian, and so, less ancient than some of those of the caves and river gravels of Europe. Egypt, in short, in so far as man is concerned,, though historically very old, is geologically very recent.

Leaving my wife and daughter to visit the mosques, palaces, schools, and bazaars of Cairo, I made an expedition along the Wady Tumilat, part of the old land of Gesen or Goshen, on the supposed route of the Exodus, thence to Suez, and across the desert to Gebel Ataka, where I saw a fine exposure of the Upper Cretaceous rocks, with the Eocene superimposed,—an anticipation of the geology of Syria. In this journey, I gave special attention to the Exodus, as recorded in the Bible. The results of this reconnaissance, and of other observations in Egypt and Palestine, I have given in brief in my little book "Egypt and Syria," and more fully in "Modern Science in Bible Lands;"[1] whilst I have noted some special features of the geology of Egypt in papers contributed to the Geological Magazine of London.

[1] Tract Society, London; and Hodder & Stoughton, London.

On returning to Cairo, I found we had to wait a few days on account of quarantine in Palestine. This time was devoted, partly, to the museum, and to viewing the fine section of the Maokattam Hill, under the guidance of Dr. Schwinforth,—who also kindly accompanied me to other points of geological interest near Cairo, —partly to packing a collection, which I had formed, of fossils and economic stones of Egypt, which is now in the Peter Redpath Museum. When the quarantine was removed, we took the first steamer from Port Said to Jaffa.

From Jaffa and Beyrout, I followed two lines of section across the principal rock formations and physical features of Palestine, so as to learn as much as possible in the short time at my disposal,—one by Jerusalem and the Dead Sea, the other over the Lebanon. We were much indebted in these excursions to the kindness of Dr. Selah Merrill, the American Consul at Jerusalem, and to Dr. Bliss, Dr. Post, and other members of the Missionary College at Beyrout. In the Lebanon country, I was especially interested in the deposits affording traces of prehistoric man, which were found to be of two ages; one of these, like the older cavern deposits, belongs to the age of the mammoth and Tichorhine rhinoceros, equi-

valent to that of Palæocosmic, Palæolithic, or antediluvian man; the other to the post-diluvian time, when the Lebanon had its present geographical relations, and was inhabited by recent fauna.[1] In both periods flint knives were used, and the people seemed to have been hunters. It was very striking, thus to find the evidence of two human ages, anterior to the arrival of the Phœnicians on the coast. In one of our excursions, we visited the Maronite village of Zahleh, perched on a shoulder of the Lebanon, where we were received by Mr. Dale, a noble example of a Christian missionary. The rocks of the Lebanon are Cretaceous limestones for the most part, but there is an outcrop of Eocene age at Zahleh, and the great plain of Cœle-Syria must have been under water at a much later date.

From Beyrout, we turned our faces westward, and had the opportunity by the way, of seeing something of several historic places of interest, and of obtaining glimpses of their geological surroundings. We visited Smyrna, Athens, Corfu, Trieste, and Venice, and remained a short time at Lucerne, Basle, Bonn, and Cologne. We made a somewhat longer stay at Brussels, studying the wonderful collec-

[1] For detail, see "Modern Science in Bible Lands."

tions relating to prehistoric man, accumulated by Dupont in its museum. From Brussels we returned to London, whither many weighty boxes of specimens had preceded us, on their way to Montreal.

In London, I could remain only for a short time, as it was necessary to be in Montreal for the meeting of the British Association, at the end of August. I had besides, to visit Edinburgh, in order to be present at the Tercentenary of the University, a great and interesting occasion, during which I was the guest of my friend Professor Calderwood, and in the course of which I delivered an address, as a representative of McGill, and received the degree of LL.D. from my Scottish *alma mater*.

I had, properly speaking, no official connection with the meeting of the British Association in Montreal. Strong and active committees had been pushing forward the preparations, and little remained for me to do, except some details connected with the use of College buildings, an entertainment which we proposed giving to the Association, and certain honorary degrees to be conferred on some of its leading members. I found, however, in these and other matters, many things to attend to, and when the meeting began, I was in constant

request, to smooth over small difficulties, to provide for details that had been omitted, as well as to speak with a great number of persons who looked to me for guidance in the affair. During the meeting, we had Dr. Asa Grey and Dr. Daniel Wilson as guests, and practically kept open house. I thus had very little time even to attend the geological section, nor was I able to take part in the excursions, or to go to the Philadelphia meeting, since the rearrangement of our buildings and many other matters had to be seen to, for the opening of the session in September. To me personally, except in regard to the public evening meetings, the week was almost a blank. The meeting, however, was evidently a successful one, the number of members and associates being 1773, or nearly equal to an average English meeting, and much above many of the smaller ones. Nearly 600 members and associates from England were among the number, and there were many also from the United States. The arrangements made for luncheon on the college grounds seemed excellent, and we were favoured with fine weather, which made it very pleasant for members so inclined, to spend their time there, or in the neighbouring mountain park. The meetings of the sec-

tions were held close to one another, and had ample accommodation. Three hundred and twenty-seven papers and reports were read. Of these sixty-five were by Canadian authors, and forty-three by members from the United States. The funds provided for the occasion by the Dominion Government, and by the citizens of Montreal, proved adequate, and the Association itself lost nothing financially by the venture. The great excursion to the west, over the Canadian Pacific Railway, was a success, and, but for the death of one of the members of the Association, Mr. Brown of Worcester, there would not have been a cloud to throw a shadow on the occasion.

In the many accounts that afterwards appeared in England, of the meeting in Montreal, nothing was expressed but satisfaction with the arrangements, and there can be no doubt that it greatly tended to give credit to Canada, and to make it, its institutions and resources, better known.

On my return from England in 1884, and before the meeting of the British Association, I had found that a new thing had occurred in our college life, but one that I had anticipated for some time, in consequence of the work of

the Ladies' Educational Association, of the Girls' High School, and of some discussions in our corporation; and one for which I had been collecting information in England. Eight young ladies, who had been educated at the Girls' High School, waited on me, to express their desire to be admitted as students in the University. The serious consideration of this matter had to be deferred till after the meeting of the British Association, but it was while this was in progress, that my friend Sir Donald A. Smith, Chancellor of the University, called me out of the geological section to intimate his wish to bestow the handsome sum of $50,000 on the University, in aid of separate classes for women. During this session and the following one, I was much occupied in arranging and systematising the "Donalda" special course for women, under the terms of this bequest.

It was in the winter of 1884-85 also, that I began those studies and reports on the fossil plants collected by the Geological Survey, in the North-West Territories, that have appeared in successive volumes of the transactions of the Royal Society of Canada. I had, several years before, examined a collection from the Laramie, or "Lignite Tertiary," made by my

son,—then geologist of the Boundary Line Commission,—but I had not continued this pursuit, nor made any consecutive studies of these fossils, which, however, I now found very interesting, especially in connection with the sequence of the several floras in geological time.

I had hoped, too, during this and the following year, to find time to write out my notes on eastern travel, both because I believed that the conclusions arrived at were in themselves of value, and since I felt desirous of showing some tangible results of my explorations, to the friends whose liberality had made them so pleasant and profitable. It was therefore with somewhat mixed feelings that I learned that the British Association had, at its Aberdeen meeting, elected me as President for the ensuing year,—an honour which necessitated another visit to England, and the preparation of a presidential address.

This visit to the old land in 1886, although of brief duration, proved one of the most agreeable and memorable episodes in my life. My wife and daughter preceded me to London, and enjoyed some of the hospitalities, which, on the occasion of the Indian and Colonial Exhibition, were so freely extended to visitors

from outlying parts of the Empire, alike by public bodies and by private individuals. So soon as my college duties permitted of my getting away, I joined them, and was enabled to employ the time before the meeting of the Association both profitably and pleasantly, partly in London, and partly at one or other of the country houses to which we were invited. At Birmingham we were guests of the Mayor, the late Sir Henry Martineau. My address, on the History of the North Atlantic, was delivered in the town hall, before a large audience, and was well received.

The presidency of the British Association for the Advancement of Science, on this occasion, I regard as the greatest honour of my life, and following, as it did, my presidency of the similar American Association, has seemed to confer a sort of international status in the scientific world, which, in so far as it goes, is unique.

A somewhat amusing incident which occurred during the Birmingham meeting may perhaps stand repetition here. In my address, I had referred to the future of the Atlantic Ocean and its shores, and had remarked, that possibly some new crumpling up of the earth's crust, near the shores of the present ocean

might be due, and that, as the greater accumulations of sediment were forming on the American side, it was probable that the Atlantic coast of America would be the first scene of disturbance. Lest, however, such a forecast might give rise to misconceptions, I remarked that it was something to be looked for only in the distant future, "not an event of to-day or to-morrow." It so happened, that the time of the delivery of my address was that of the Charleston earthquake of 1886, the news of which appeared in the next morning's papers, together with the report of the address itself, and when I came into the reception room that day, I was at once accused by Dr. Barker of Philadelphia, of having had a private intimation of the event, while other members alluded to the circumstance that Lyell had been said to carry an earthquake in his pocket.

CHAPTER XIII

THE HIGHER EDUCATION OF WOMEN

DURING the early years of my connection with McGill, when we were occupied with the enlargement of the Faculty of Arts, and the establishment of the Normal School, the movement for the higher education of women was still in its infancy, both in Great Britain and in the United States. We were, it is true, founding in the Normal School, what was practically a professional college for women, but beyond this there were no means of proceeding, nor did there seem to be any demand, since there were few opportunities enabling young women to fit themselves for entering college. Still, I was not without thought in reference to this new departure, as may be gathered from the following little episode in connection with my earlier work in Montreal. The late Miss Hannah Willard Lyman, a noble woman, subsequently appointed Lady Principal of Vassar College, was then the head of a school for young ladies in Mon-

treal. She was desirous of securing for some of her pupils the benefit of a course in Natural Science, and I invited her to attend, with such of her pupils as she might care to bring, my afternoon lectures. At the time, our classes of men were small, the ladies occupied a separate part of the hall, and Miss Lyman always accompanied them. No difficulty, so far as I know, arose, but the experiment was in some respects unsatisfactory, so, after the experience of one session, it was tacitly dropped by mutual consent.

In the University lecture for the session of 1869-70, attention was drawn by me to the subject of the higher education of women, in the following somewhat tentative way:—

"I believe that further benefits might be conferred by the University, as to the education of young women. I have no doubt that the more elementary education, as now carried on in our many excellent private schools for girls, is efficient, and I have no wish that the University should assume these responsibilities. But there seems no reason why the school examinations of the University should not, here, as in the case of Cambridge and Oxford, include the pupils of schools for young women; and I think it would be quite pos-

sible for the University to provide lectures on scientific and literary subjects, which would be open to the pupils of all ladies' schools in the city, and that certificates of attendance and examination might be given to such pupils. I do not propose, either that young women should attend the ordinary college classes, or that, except in special cases, the ordinary professors should lecture to them. I would have special class rooms, and, in many instances at least, special lecturers appointed by the University. Of course, this is a purpose for which the constitution of the University does not permit its funds to be used, even if they were sufficient for it, which they are not. I only wish to intimate my conviction, that an opening for usefulness lies in this direction,—one which I have often wished to have the means of cultivating, knowing that in this country, very few young women enjoy, to a sufficient extent, the advantages of the higher kinds of education ; and that the true civilisation of any people is quite as much to be measured by the culture of its women as by that of its men."

Early in 1870, the Governors determined to make a further appeal to the liberality of the citizens of Montreal, to increase the funds of

the University, and a meeting of friends, convened by the Governors, was held in February of that year, in the college library, at which resolutions were passed and a committee appointed to that end. At this meeting, in addition to three resolutions, which had been prepared beforehand, an impromptu resolution was moved by the late Dr. Wilkes, and carried unanimously, in the following terms:—

"That this meeting rejoices in the arrangements made in the mother country, and on this continent, to afford to young women the opportunity of a regular college course; and being persuaded of the vital importance of this matter to the cause of higher education, and to the well-being of the community, respectfully commends the subject to the consideration of the Corporation of the University, for such action as the expected addition to the endowment may enable them to take."

The result of the appeal, was an addition of $52,000 to the endowment of the University, besides the W. C. McDonald scholarships, of the annual value of $1250, and the Jane Redpath exhibition, of the annual value of $90. No part of these sums was, however, specially devoted to the education of women.

In December of the same year, an entertainment was given to the benefactors in the William Molson Hall, on which occasion the thanks of the University were formally given to them by the Chancellor, the Hon. Judge Day. In his address on this occasion, he referred to the resolution of Dr. Wilkes in the following terms :—

"I now ask your patience for a closing word. It is about the ladies. I have read to you Dr. Wilkes' resolution, which points to the necessity for providing the means of furnishing a higher education for women, a matter in which we are wofully behind the age. I shall not discuss this subject now,—it is far too important for the few moments I could bestow upon it,—but I may say, that I trust the time is not far distant, when McGill College may become the privileged instrument of ministering to this urgent need. In this whole matter of education for either sex, women are directly and deeply interested. They are its earliest and most important ministers. Upon the delicate impressions received from the mother's gentle accents, depends, in a large measure, the development of character in youth and manhood. These impressions, so soft and slight,

and at first apparently unimportant, deepen and harden with the growth of each succeeding day. They become the ineffaceable things of life, and extend, for good or for evil, through all the motives of action, and the impulses of thought, to the last breath of existence. But woman is not only the first great high priestess of education, she is also, in a signal degree, dependent upon its influences. From the feebleness of her frame, and the fineness of her organisation, it regulates her position and happiness far more than that of man. The wild hunter, or the savage chieftain, differs incomparably less, from the polished leader of European armies, or the accomplished Senator, than the poor, oppressed, broken-spirited slave, whom the savage calls his wife, differs from the cultured, refined, respected and beloved woman of civilised life. It is education which has made the difference. There is no surer evidence of the degree of that education, which is an essential part of the Christian civilisation of a people, than the social position of its women, and it is for the enlargement of the means of furthering this great object,—of vital importance to both sexes and all classes,—that the University has made its appeal for sympathy and for succour."

I should here mention an endowment, which stands first in order of time, as indicating the course to be taken by the University in this matter, viz., the Hannah Willard Lyman Memorial Fund. On the death, in 1871, of the lady whose name this fund bears, a number of her former pupils determined, in some way, to perpetuate her memory. With a prophetic instinct as it seemed, they chose to form a scholarship or prize for women in the University, and this was to be given, "in a college for women affiliated to the University, or in classes for the higher education of women approved by the University." In the first instance, the income of the fund was given for prizes in the Ladies' Educational Association, founded in 1871, and more recently, has been awarded in prizes in the Donalda Special Course. These ladies obviously looked forward to the affiliation to the University of a college of the character of Vassar College, of which Miss Lyman had been Lady Principal.

The question as to how the aims and objects of Dr. Wilkes' resolution, or the Hannah Willard Lyman endowment, were to be carried out, seemed, however, to have no immediate means of solution. Neither

the Governors, nor the mover of the resolution, had any idea of imitating the practice, then being introduced in colleges in the western States, of admitting young women into the classes for men. Their ideas were rather based on the plan of Vassar College, or on the methods at that time being introduced in England. Information was needed as to the latter, and having the opportunity of spending the summer of 1870 abroad, my wife and I made it a part of our business, as already mentioned, to study the working of the associations which had been formed for this purpose both in Scotland and England. These were at the time in their infancy, but were exciting much public attention, and aimed at bringing young women up to the standard of the college degree, though no provision had as yet been made by the universities for granting such degrees. After much inquiry, and visiting colleges in Cambridge and elsewhere, the method which appeared to us most suited to secure good results in Montreal, was that pursued by the Ladies' Educational Association of Edinburgh. Accordingly, on returning to Montreal in the autumn of 1870, the subject was discussed with the professors of the Univer-

sity and others, whom it was desirable to interest in the work, but I found that the moral obligation, which, in my judgment, rested on the University in the matter, did not weigh very heavily with the greater number of these, and the result was rather the suggestion of difficulties than any offer of cordial co-operation,—though this was subsequently given when the work was actually commenced.

In these circumstances, we turned from the University proper to its lady friends, and at a large and influential meeting of ladies, held under the auspices of the late Mrs. John Molson, in her residence of Belmont Hall, the Ladies' Educational Association of Montreal was constituted, on a plan which had been previously carefully prepared,—Mrs. Molson being elected president, while Mrs. Simpson, one of our ablest and most experienced educationalists, became honorary secretary. This association carried on its useful work for fourteen years, or up to the time of the institution of the classes for women in the University, and was entirely self-supporting, charging only moderate fees to its students, and paying its lecturers handsomely; whilst it undoubtedly contributed largely to cultivate

a taste for higher education, and enabled young women to obtain at least some of the benefits of a university course.

I had the honour, in October 1871, of delivering the introductory lecture of the first session of the Ladies' Educational Association, and, as the substance of this lecture had been discussed beforehand with some of the thoughtful women engaged in the work, it may be taken, to some extent, as an expression of their views, and I may be pardoned for quoting a portion of it here:—

"The ancient Stoics, who derived much of their philosophy from Egypt and the East, believed in a series of great cosmical periods, at the end of each of which, the world and all things therein were burned by fire, but only to reappear in the succeeding age, on so precisely the same plan, that one of these philosophers is reported to have held that in each succeeding cycle there would be a new Xantippe to scold a new Socrates. I have sometimes thought that this illustration expressed, not merely their idea of cosmical revolutions, but also, the irrepressible and ever recurring conflict, of the rights and education of women. Notwithstanding all that may be said to the

contrary, I believe that Xantippe was as good a wife as Socrates, or any of his contemporary Greeks, deserved. She no doubt kept his house in order, prepared his dinners, and attended to his collars and buttons, (if he used such things), and probably had a general love and respect for him. But she was quite incapable of seeing any sense or reason in his philosophy, and must have regarded it as a vexatious waste of time, and possibly as a chronic source of impecuniosity in family affairs. The educated Greek of her day had small respect for woman, and had no idea of any other mission for her than that of being a domestic drudge. No one had ever taught Xantippe philosophy,—hence she despised it, and being a woman of character and energy, she made herself felt, as a thorn in the flesh of her husband and his associates. In this way, Xantippe derived from her husband's wisdom only a provocation of her own bad temper, and he lost all the benefits of the loving sympathy of a kindred soul; and thus, the best and purest of heathen philosophers found no helpmeet for him.

"So, Xantippe becomes a specimen of the typical uneducated woman, in her relation to

the higher departments of learning and human progress. In ordinary circumstances she may be a useful household worker. If emancipated from this, she may spread her butterfly wings in thoughtless frivolity, but she treats the higher interests and efforts of humanity with stolid unconcern, or insipid levity, or interferes in them with a capricious and clamorous tyranny. In what she does, and in what she leaves undone, she is equally a drag on the progress of what is good and noble, and the ally and promoter of what is empty, useless, and wasteful. If the Stoics anticipated a perpetual succession of such women, they might well be hopeless of the destinies of mankind.

"But the Stoics wanted that higher light, as to the position and destiny of woman, which the Gospel has given to us; and it is a relief to turn from their notions, to the testimony of the Word of God. The Bible has some solution for each of the difficult problems of human nature, and it has its own theory on the subject of woman's relations to man.

"In the old record in Genesis, Adam, the earth-born, finds no helpmeet for him among the creatures, sprung, like himself, from the ground, but he is given that equal helper in the woman made from himself. In this new

relation he assumes a new name. He is no longer Adam, the earthy, but Ish, lord of creation, and his wife is Isha,—he the king, and she the queen, of the world. Thus in Eden, there was a perfect unity and equality of man and woman, as both Moses and our Saviour, in commenting on this passage, indicate,—though Milton, usually so correct as an interpreter of Genesis, seems partially to overlook this. But, a day came when Isha, in the exercise of her independent judgment, was tempted to sin, and tempted her husband in turn. Then comes a new dispensation of labour and sorrow and subjection, the fruit, not of God's original arrangement, but of man's fall. Simple as a nursery tale, profounder than any philosophy, this is the Bible theory of the subjection of woman, and of that long succession of wrongs, and sufferings, and self-abnegation, which have fallen to her lot as the partner of man in the struggle for existence, in a sin-cursed world. But even here, there is a gleam of light. The seed of the woman is to bruise the head of the serpent, and Isha receives a new name, Eve, the mother of life. For in her, in every generation, from that of Eve to that of Mary of Bethlehem, resided the glorious possibility of bringing forth the

Deliverer from the evils of the fall. This great prophetic destiny formed the banner of woman's rights, borne aloft over all the generations of the faithful, and rescuing woman from the degradation of heathenism, in which, while mythical goddesses were worshipped, the real interests of living women were trampled under foot.

"The dream of the prophets was at length realised, and in Christianity, for the first time since the gates of Eden closed on fallen man, woman obtained some restoration of her rights. Even here some subjection remains, because of present imperfection, but it is lost in the grand status of children of God, shared alike by man and woman; for according to St. Paul, with reference to this divine adoption, there is 'neither male nor female.' Our Lord Himself has given to the same truth a still higher place, when, in answer to the quibble of the Sadducees, He uttered the remarkable words, 'They who shall be accounted worthy to obtain that world, neither marry nor are given in marriage, for they are equal to the angels.' If both men and women had a higher appreciation of the dignity of their position as children of God,—if they would more fully realise that world, which was so shadowy to

philosophic Sadducee and ritualistic Pharisee, though so real to the mind of Christ, we should have very little disputation about the relative rights here, of men or women, and would be more ready to promote every effort, however humble, which may tend to elevate and dignify both. Nor need we fear that we shall ever, by any efforts we can make, approach too near to that likeness to the angels, which embraces all that is excellent in intellectual and moral strength, and in exemption from physical evil.

"But what bearing has all this on our present object? Much in many ways, but mainly in this, that, while it removes the question of the higher training of women altogether from the sphere of the silly and flippant nonsense so often indulged in on the subject, it shows the heaven-born equality of man and woman, as alike in the image and likeness of God; the evil origin of the subjection and degradation, inflicted on the weaker sex; and the restored position of woman as a child of God under the Gospel, and as an aspirant for an equal standing, not with man only, but with those heavenly hosts, which excel in strength. In this light of the Book of books, let us proceed to consider some points bearing on our

present duty in reference to this great subject.

"Only a certain limited proportion of men or women can go on to a higher education, and those who are thus selected, are either those who, by wealth and social position, are enabled to claim this privilege, or those who intend to enter into professions, which are believed to demand a larger amount of learning. The question of the higher education of women in any country, depends very much on the relative numbers of these classes among men and women, and on the views which may be generally held as to the importance of education for ordinary life, as contrasted with professional life. Now, in this country the number of young men who receive a higher education, merely to fit them for occupying a high social position, is very small. The greater number of young men who pass through our colleges, do so, under the compulsion of a necessity to fit themselves for certain professions. On the other hand, with the exception of those young women who receive an education for the profession of teaching, the great majority of those who obtain what is regarded as higher culture, do so merely as a means of general improvement, and to

fit themselves better to take their proper place in society. Certain curious and important consequences flow from this. An education, obtained for practical professional purposes, is likely to partake of this character in its nature, and to run in the direction rather of hard utility than of ornament; that which is obtained as a means of rendering its possessor agreeable, is likely to be æsthetical in its character, rather than practical or useful. An education pursued as a means of bread-winning, is likely to be sought by the active and ambitious of very various social grades; but that which is thought merely to fit for a certain social position, is likely to be sought, almost exclusively, by those who move in that position. An education intended for recognised practical uses, is likely to find public support, and to bear a fair market price; that which is supposed to have a merely conventional value, as a branch of refined culture, is likely to be at a fancy price. Hence it happens, that the young men who receive a higher education, and by means of this attain to positions of responsibility and eminence, are largely drawn from the humbler strata of society, while the young women of those social levels, rarely aspire to similar

advantages. On the other hand, while numbers of young men of wealthy families are sent into business with a merely commercial education, at a very early age, their sisters are occupied with the pursuit of accomplishments, of which their more practical brothers never dream. When to all this is added the frequency and rapidity of changes in social standing, in a country like this, it is easy to see that an educational chaos must result, most amusing to any one who can philosophically contemplate it as an outsider, but most bewildering to those who have any practical concern with it,—especially, I should suppose, to careful and thoughtful mothers, whose minds are occupied with the connections which their daughters may form, and the positions which they may fill in society.

"The educational problem which these considerations present, admits, I believe, of but two general solutions. If we could involve women in the same necessity for independent exertion, and professional work, as men, I have no doubt, that, in the struggle for existence, they would secure to themselves an equal, perhaps a greater, share of the more solid kinds of higher education. Some strong-minded women and chivalrous men, in our day, favour

this solution, which has, it must be confessed, some show of reason in older countries, where, from unhealthy social conditions, great numbers of unmarried women have to contend for their own subsistence. But it is opposed by all the healthier instincts of our humanity, and in countries like this, where very few women remain unmarried, it would be simply impracticable. A better solution would be, to separate, in the case of both sexes, professional from general education, and to secure a large amount of the latter, of a solid and practical character, for both sexes, both for its own sake and because of its beneficial results in the promotion of our well-being, considered as individuals, as well as in our family, social, and professional relations. This solution also has its difficulties, and it cannot, I fear, ever be fully worked out, until either a higher intellectual and moral tone is reached in society, or, until nations visit with proper penalties the failure, on the part of those who have the means, to give to their children the highest attainable education, and with this, also, to provide the funds for educating all those who, in the lower schools, prove themselves to be possessed of promising abilities. It may be long before such laws can be instituted even

in the more advanced communities. In the meantime, in aid of that higher appreciation of the benefits of education that may supply a better, if necessarily less effectual stimulus, I desire to direct your attention to a few considerations, which show that young women,—viewed, not as future lawyers, physicians, politicians, or even teachers, but as future wives and mothers,—should enjoy a high and liberal culture; and which may help us to understand the nature and means of such culture.

"The first thought that arises, on this branch of the subject, is that woman was intended as the helpmate of man. And here, I may first speak of that kind and loving ministry of woman which renders life sweet, and mitigates its pains and sorrows, and which is to be found not solely among the educated and refined, but among the simplest and least cultured,—a true instinct of goodness, needing direction, but native to the heart of woman, in all climes and in all states of civilisation. Yet, it is sad to think how much of this holy instinct is lost and wasted through want of knowledge and thought. How often do labour and self-sacrifice become worse than useless because not guided by intelligence; how often an influ-

ence that would be omnipotent for good, becomes vitiated and debased into a power that enervates and enfeebles the better resolutions of men, and involves them and their purposes in its own inanity and frivolity. No influence is so powerful for good over young men as that of educated female society. Nothing is so strong to uphold the energies, or to guide the decisions, of the greatest and most useful men, as the sympathy and advice of one who can look at affairs from without, (from the quiet sanctuary of home,) and can bring to bear on them the quick tact and ready resources of a cultivated woman's mind. In this, the loftier sphere of domestic duty, in her companionship and true copartnership with man, woman requires high culture, quite as much as if she had, alone and unshielded, to fight the battle of life.

" It may be said that, after all, the intelligence of the average woman is quite equal to that of the average man, and, that highly educated women would not be appreciated by the half-educated men who perform most of the work of the world. Granting this, it by no means follows that the necessity for the education of women is diminished. Every Xantippe cannot have a Socrates, but every

wise and learned woman can find scope for her energies and abilities. If need be, she may make something even of a very commonplace man. She can greatly improve even a fool, and can vastly enhance the happiness and usefulness of a good man, should she be so fortunate as to find one.

"But, it is in the maternal relation that the importance of the education of woman appears most clearly. It requires no very extensive study of biography, to learn, that it is of less consequence to a man what sort of father he may have had, than what sort of mother. It is, indeed, a popular impression that the children of clever fathers are likely to exhibit the opposite quality. This, I do not believe, except in so far as it results from the fact, that men in public positions, or immersed in business, are apt to neglect the oversight of their children. But it is a noteworthy fact that eminent qualities in men may often be traced to similar qualities in their mothers. Knowledge, it is true, is not hereditary, but high mental qualities are so, and experience and observation seem to prove that the transmission is chiefly through the mother's side. But leaving this physiological view, let us look

at the purely educational. Imagine an educated mother, training and moulding the powers of her children, giving to them in the years of infancy those gentle yet permanent tendencies, which are of more account in the formation of character than any subsequent educational influences, selecting for them the best instructors, encouraging and aiding them in their difficulties, rejoicing with them in their successes, able to take an intelligent interest in their progress in literature and science. How ennobling such an influence, how fruitful of good results, how certain to secure the warm and lasting gratitude of those who have received its benefits, when they look back in future life on the paths of wisdom along which they have been led! What a contrast to this is the position of an untaught mother, finding her few superficial accomplishments of no use in the work of life, unable wisely to guide the rapidly developing mental life of her children, bringing them up to repeat her own failures and errors, or, perhaps to despise her as ignorant of what they must learn! Truly, the art and profession of a mother is the noblest and most far-reaching of all, and she who would worthily discharge

its duties must be content with no mean preparation. It is worth while also to say here, that these duties and responsibilities in the future, are not to be measured altogether by those of the past.

"Several features of the present movement afford, I think, especial reasons for congratulation. One is, that this is an association of ladies for educational purposes, originating with ladies, carried on by them, and supported by their contributions. Another is, that the movement is self-supporting, and not sustained by any extraneous aid. It will I hope attract to itself endowments, which may give it a stronger and higher character, but its present position of independence is the best guarantee for this, as well as for all other kinds of success. Again, this association embraces nearly all that is elevated in social and educational standing in our city, and has thus the broadest and highest basis that can be attained among us, for any effort whatever.

"We are not alone, nor are we indeed in the van of this great work. I need not speak of the United States, where the magnificent Vassar College, (with which the name of one of our excellent and learned women was con-

nected so usefully), Cornell University, the University of Michigan, and others, have marked strongly the popular sentiment as to the education of women. In Canada itself, Toronto, and even Quebec and Kingston, have preceded us, though I think, in the magnitude of our success, we may hope to excel them all. In the mother country, the Edinburgh Association,—which has afforded us the model for our own,—the North of England Educational Council, the Bedford College in London, the Cheltenham College, the Hitchin College, Cambridge, (since developed into Girton College), also Newnham College, the Lady Margaret Somerville Halls at Oxford, the Alexandra College in Dublin, are all indications of the intensity and direction of the current. On the continent of Europe, Sweden has a State college for women; the Victoria Lyceum at Berlin has the patronage of the Princess Royal; the University of Paris has established classes for ladies; and even St. Petersburg has its university for women.

"All these movements have originated not only in our time, but within a few years, and they are evidently the dawn of a new educational era, which, in my judgment, will see as great an advance in the education of our

race as that which was inaugurated by the revival of learning, and the establishment of universities for men, in a previous age. It implies, not only the higher education of women, but the elevation, extension, and refinement of the higher education of men. Colleges for women will, as new institutions, be free from many evil traditions which cling about the old seats of learning. They will start with all the advantages of our modern civilisation. They will be animated by the greater refinement, tact, and taste of woman. They will impress many of these features upon our older colleges, with which, I have no doubt, they will become connected under the same university organisations. They will also greatly increase the demand for a higher education among young men. An Edinburgh professor is reported to have said to some students who asked ignorant questions, 'Ask your sisters at home, they can tell you,'—a retort which, I imagine, few young men would lightly endure. So soon as young men find that they must attain to higher education before they can take a creditable place in the society of ladies, we shall find them respecting science and literature almost as much as money, and attaching to the services of the college pro-

fessor as much importance as to those of their tailor."

Simultaneously with the institution of the lectures of the Ladies' Association, we were moving, in the Protestant Board of School Commissioners, for the establishment of a high school for girls. It was not, however, until 1874 that the requisite means for this purpose were in possession of the Board,—the urgent claims of the elementary schools having very properly been given precedence over all other schemes. On February 4th, 1874, the minutes of the Board record, that, "Dr. Dawson brought forward the subject of the Girls' High School. A committee was appointed, consisting of Dr. Dawson, Dr. McVicar, and Mr. Lunn, to make inquiries as to a suitable site, and to suggest to the Board a plan of operation for the same." The committee acted promptly, and on February 28th, presented a report on an eligible site, of which they had secured the refusal, and on a plan for the organisation of the school. Unforeseen delays, however, occurred in the matter of the site and building, but on May 27th, 1874, it was determined to engage temporary rooms and begin the school; and before the end of June premises were secured, and Mrs.

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Scott, (now Mrs. Morton), a lady trained in the McGill Normal School, was engaged as first lady principal, together with four teachers trained in the same institution.

Though not directly connected with each other, the Ladies' Association, and the Girls' High School were not without mutual relations. When the idea of a high school for girls, in addition to the long established high school for boys, was first suggested, there were many objections to it, and the Commissioners might have had some hesitation in facing the obloquy which they incurred, had it not been for the new interest excited by the lectures for ladies, and the growing wish for some systematic study, leading to an actual college education. Fortunately, we could always depend on the Normal School for a supply of qualified lady teachers.

The consideration which, to my own mind, constituted the great responsibility of the movement, was its possible bearing on the University. The High School for boys had been one of the best feeders of the college, and it was expected that, ere long, a demand would arise for a college training on the part of those who had passed through the Girls' High School. We opened to them, as one

distinction, the examination for Associate in Arts, and a class of ten passed in 1877. The examinations for Senior Associate were then opened to them, in the hope, that provision might be made, partly by the Ladies' Association, and partly by private tuition, to enable them to attain a standing equal to that of the second year of the college course. Few, however, were found able to avail themselves of this privilege.

Up to this point, we had slowly and laboriously worked since 1855, and now the questions remained :—would women ask admission to collegiate classes, and if they did, what means could be adopted for supplying the demand? For my own part, I felt persuaded that the public opinion of the Protestant community of Montreal, would not tolerate the method of mixed classes, in use in some other communities ; and that, when the demand came, the means would be found to meet it. I waited, however, patiently, both for the demand, and for the means, and meanwhile prepared to make it part of the business of another visit to Great Britain, which I had in prospect, to collect all the additional information possible, so as to be armed on my return, for all contingencies.

As already said, I returned to Canada in the summer of 1884. Shortly afterwards, a deputation of ladies who had already passed the examination for Associate in Arts, called on me, and expressed their earnest wish to proceed to the examination for the degree in Arts, if the necessary means of education could be provided. Here, then, was the demand, and coming from those who had distinct claims on our consideration, but what of the means? It was but a few weeks later, (as before mentioned), that Sir Donald Smith asked me if it was desired to establish collegiate classes for women, and stated that, if so, he was prepared to give the sum of $50,000 on conditions to be settled by him. I confess that the coincidence of the demand for higher education, made by those who had so great claims upon us, and the offer of so liberal a benefaction, by a gentleman to whom no application for aid had been made on my part, seemed to me to constitute one of those rare opportunities for good, which occur but seldom to any man, and which are to be accepted with thankfulness, and followed up with earnest effort. From that time, the subject occupied my closest attention. The offer was duly communicated to the Board of Governors, and

was accepted by them, the conditions being that the classes were to be wholly separate and distinct, and that no expenditure was to be incurred beyond the income of the endowment. This sum, however, proved sufficient to provide the necessary duplicate courses, for the first and second years in the Arts Faculty, and in the autumn of 1884, the first session for women was commenced, with fourteen regular, and thirteen occasional students.

In October 1886, Sir Donald Smith increased his endowment to $120,000, with the view of providing sufficient income for courses in the third and fourth years. In the session of 1886–87 there were already 20 regular, and 58 partial and occasional, students in this special course of the Faculty of Arts. During the next year the number increased to 26, and 82, respectively, thus making 108 students in all, and at the end of this session eight young women received, for the first time in McGill, the degree of B.A.

This great work is not yet complete. We look forward to a college for women, either a college of the University, co-ordinate with McGill College, or affiliated to the University. Such college, while taking advantage of the Museum, Laboratories, Library, and other

appliances of McGill College, and to a certain extent of its staff, will have its own building, provided with all modern improvements and refinements for educational work. It will have several professors and lecturers of its own, for certain of the standard subjects of the course, or for some of the accessory and optional subjects, now imperfectly, or not at all, represented in McGill. It will thus be enabled to give reciprocal aid to the work for men, and with the united staffs of two colleges working in harmony, the course of McGill, whether for men or women, will be stronger, more complete and more varied, than that of any other university in the Dominion. The writer of these reminiscences would fain live to see the realisation of all this, but delays have occurred which have rendered this prospect less likely than it was some time ago. In any case he may hope that it will be realised under his immediate successors, and he leaves to them the results of thirty years of work, which, whatever their failures and shortcomings, have, at all events, been carried out with earnestness, perseverance, and honesty of purpose. I thank God, that we have been able to do what we have done up to this time, and desire to express my

sincere gratitude to the many friends and members of the University, from the Chancellor downwards, who have taken part in the work, or have diminished its labours and anxieties by their advice and sympathy.

I have not entered, except incidentally, into the question of the relative expediency and success, of methods of mixed and separate education of the sexes, in collegiate institutions. I desire to express, as a matter of personal opinion and experience, my entire sympathy with those who hold that the education of women should be conducted, as far as possible, in separate classes. We should aim at a culture for woman, higher, more refining, and better suited for her nature, than that which we provide for men, and I feel convinced, that even when the course of study is the same with that for men, this result is to some extent secured, if the classes are separate.

CHAPTER XIV

CLOSING YEARS

THE years, from 1886 to 1892, were principally occupied with steady college work, increased in magnitude and anxiety by the addition of classes for women, under the Donalda endowment, and by the new professorships, buildings, and appliances due to the benefactions of Sir William McDonald and of Mr. Thomas Workman. I was thus obliged, in great measure, to intermit my original scientific work. I may mention, however, researches leading to the discovery of interesting fossil sponges in the Upper Cambrian rocks of the lower St. Lawrence.[1] I was also able to keep up my studies of the fossil plants of the Cretaceous and Tertiary of the North-West Provinces of Canada, and have placed in the hands of Professor D. P. Penhallow some undescribed

[1] For a popular account of these discoveries, first made by Dr. B. J. Harrington, see "Salient Points in the Science of the Earth," Hodder & Stoughton, London. Full descriptions and figures will be found in the Transactions of the Royal Society of Canada.

specimens throwing additional light on the Devonian flora of Scotland, Canada, and the United States, as well as material relating to the Pleistocene age in Canada,—which, as I have long ago partially shown, is not wholly "glacial," but contains many plants of the temperate and cold-temperate periods, showing alternations of somewhat mild with cold stages,—depending probably on unequal or differential elevation and subsidence. I also collected, in a little illustrated volume, my papers on the Pleistocene of Canada, under the name of "The Canadian Ice Age."

Up to 1892, or to my seventy-second year, I felt strong and well, and was not aware of any failure in energy. In September of that year, a break in the work of my life was caused by severe illness. I had come up from our cottage at Little Métis, to begin the preparations for the session, as usual, early in September, but was recalled to Métis by the serious illness of my wife, and stayed there with her until she was sufficiently convalescent to return with me to Montreal. It pleased God to restore her, so that she was able to resume her ordinary duties. Soon after, and consequent on exhausting labour, anxiety as to college matters,—then in some respects critical,

—and unusually warm and sultry weather, I was prostrated by pneumonia, which confined me to the house for two months; and was finally ordered by my medical advisers to betake myself to the South to escape the Canadian winter.

I left Montreal with my wife early in December, and we took up our abode for some time at Savannah, where the air, at that season, was balmy and summer-like, and were transported into a region of live-oaks, magnolias, palmettos, and camelias. We spent a few weeks very pleasantly, interested in the many novel aspects of southern life and nature, and in exploring all the environs of that beautiful city. In January, the weather became colder, and we fled, in company with our friends Mr. and Mrs. Finley, farther south to St. Augustine, where again we found a summer temperature, and a still further accession of southern features, in the orange groves, true palms, and many new and interesting forms of animal life on land and in the sea,—not the least curious being the quaint little land-crabs of the islands near St. Augustine. In February, we took leave with some regret of St. Augustine, and made our next sojourn on the beautiful ridge of Summerville, near Augusta, a charming winter re-

sort. Thence, as the weather became warmer, we removed to Ashville, on the mountains of North Carolina, where we met some Canadian friends, and enjoyed delightful air and scenery. From Ashville we went north to Washington, where we found the American Academy in session, and met many scientific friends. There also, at an entertainment given by Sir Julian and Lady Pauncefote, on the occasion of Sir Julian's elevation to the rank of Ambassador for Great Britain, we had an opportunity of seeing the greater part of the diplomatic corps at that time in Washington,—a most picturesque and interesting gathering. Our next stopping place was Baltimore, where we spent a day under the guidance of our old friend Dr. William Osler, and of the president, Dr. Gilman, in visiting the Johns Hopkins University. We then moved northward by way of New York, where we saw some of our friends connected with Columbia College, and returning to Montreal, met with a reception from the students, too enthusiastic for so old and worn-out a worker, but not the less gratifying.

When about to leave Montreal, on my journey to the South, in December, I addressed the following letter to the students:—

"DEAR YOUNG FRIENDS,—I had hoped, in the present session, to be among you as usual, doing what I could, officially and personally, for your welfare, but was suddenly stricken down by a dangerous illness. In this, I recognised the hand of my Heavenly Father, doing all things for the best, and warning me that my years of active usefulness are approaching their close, and that it is time to put off my armour, and assume the peaceful garb of age, in which perhaps I may yet be spared to be of some service in the world.

"For the time being, I must be separated from the work that has always been to me a pleasure, and you will excuse me for addressing to you a few words, on topics which seem to me of highest moment to you as students. I may group these under the word 'Loyalty,' a word which we borrow, with many others, from the French, though we have the synonym 'leal,' which if not indigenous, has at least been fully naturalised both in English and Scottish. These words are directly associated with the idea of law and obligation, and with the trite, though true, adage, that we who would command must first learn to obey.

"I need scarcely remind you of that loyalty

which we owe to the sovereign lady the Queen, and to the great Empire over which she rules. I have had frequent occasion to note the fact, that this sentiment is strong in the rising generation of Canadians, and nowhere more so than in McGill. It is indeed not merely a sentiment, though, even in a time which boasts of being practical and utilitarian, the feelings of the heart count for something: it is based also on the rational appreciation of the benefits of a rule, which, while allowing the greatest freedom of individual action, secures equal rights and protection for all.

"We are, every one of us I hope, loyal to our University, and to the University as a whole, not merely to any particular faculty of it. McGill has endeavoured, more than most universities, carefully to adapt its teaching to the actual wants and needs of the student, whether in the matter of that general academical learning which makes the educated man, or of that special training which fits the graduate for taking his place, creditably, in the highest walks of professional life. To this, I think, its success has been largely due. Yet, with all the breadth and the elasticity of our system, we cannot per-

fectly meet every case, and there are still desiderata, the want of which is most deeply felt by those engaged in the management of the University. Our course, however, has been onward and upward, and it may be truly said that no session has passed in which something has not been added to our means of usefulness. The future, indeed, has endless possibilities, and there will be ample scope for improvement,—and perhaps also for occasional complaints,—when the youngest students of to-day have grown to be grey-haired seniors. You have good cause, notwithstanding, to be proud of your University, and to cherish feelings of affection and gratitude to the wise and good men, who, amid many difficulties, have brought it to its present position, and are still urging it onward.

"You should be loyal to the ideal of the student. You are a chosen and special band of men and women, selected out of the mass, to attain to a higher standing than your fellows, in those acquirements which make life noble and useful. It is not for you to join in the follies of frivolous pleasure-seekers, or to sacrifice the true culture of your minds and hearts to the mere pursuit of gain. Your

aims are higher, and require isolation from the outer world, and self-denial, in the hope that what you are now sowing and planting, will bear good fruit in all your future lives. Live up to this ideal, and bear in mind that self-control, and the habits of mind which it implies, are of themselves worth more than all the sacrifices you make.

"Be loyal to the memories of home. I regret very much that McGill cannot at present offer to its students such temporary homes as college halls could supply. The time for this is coming, I hope soon. But most of you have those at home who look on your residence here with solicitude and longing, who will rejoice in your successes, and perhaps be heartbroken should any evil befall you. It is customary to say that young people at college are removed from the restraints of home and its influences for good. But this need not be. To the truly loyal, absence should make these influences more powerful, and the thought of those who are watching you with loving hearts, in distant homes, should be a strong impelling motive in the student's life.

"Next to home is heaven, and, let me now add, loyalty to Him who reigns there, and

to the Captain of our salvation made perfect through suffering for us. Many of you, I know, are earnest Christians and growing in spiritual life, as you advance in learning. To those who are not, let me say,—read, as a serious study, the life of Jesus Christ as given in the Gospels. Read it in the light of His own sayings, that, 'He came not to be served, but to serve, and to give His life a ransom for many,' and that, 'God so loved the world, that He gave His only begotten Son, that whosoever believeth in Him should not perish, but have eternal life.' Read of His life as the Man of Sorrows, of His agony in Gethsemane, of His death on the Cross,—crushed not merely by physical agony, but by the weight of our iniquities,—and you may then judge, if there is any obligation so great as that under which we lie to Him, any loyal service so blessed as that of the Saviour. The gate may be strait, and we may have to leave some things outside, but it is held open lovingly by the pierced hand of our Redeemer, and it leads through a happy and fruitful life to eternal joys,—to that land which the Scottish poet, whose religious ideal was so much higher than his own life, or the current theology of his time,

calls the 'land o' the leal.' That happy country is near to me, but I hope separated from you by a long, useful, and happy life; but, let us all alike look forward to meeting beyond the River of Death, in that promised land where He reigns, who said, 'Him that confesseth Me before men, will I confess before My Father that is in heaven.'

"In the meantime, you remain here to pursue useful work; I go to seek restored health elsewhere, and can only remember you in my prayers. Let us hope, that when the winter is passed we may meet once more, and that I may be able to congratulate you on well-merited success, not merely in regard to the prizes and honours which few can obtain, but in that abiding education of the mind and heart, which McGill offers to all her studious children without exception."

During the closing exercises of the college and of the Normal School, in the spring of 1893, I was able to resume, to some extent, my duties as principal, and at the Arts Convocation on April 29th, at which I was in time to be present, I concluded the session with the following address:—

"After a long, and in many respects agreeable and profitable, sojourn in the sunny

south, I rejoice and thank God once more to be able to take my place in McGill, and to greet the old familiar faces, of the city and of the land I love; and my pleasure is enhanced by the cordial welcome of colleagues and friends, and not least by the warm greeting of the undergraduates,—a reception which renews my youth. It has been a source of much gratification to me to learn, from time to time, of the continued prosperity of the University, and of the golden showers that kind friends have been pouring into her lap. To-day, at the close of one of the most successful sessions of the University, it seems as if its governors and officers had entered into a conspiracy to prove how well they can get on without a principal. I know, however, how much of care and labour the sudden breakdown of my health last autumn, has occasioned to the vice-principal, Dr. Johnson, and to the other officers of the University, and we owe sincere thanks to them for the cheerful and able manner in which extra duties have been discharged. It is also satisfactory to note, that this University is now in a position in which the absence or removal of no one man can do it substantial injury.

"It is true that the liberal gifts by which this session has been signalised, have not fallen so much on the central faculty of the University represented here to-day as on the professional faculties. We must not, however, forget the opening of that magnificent abode provided by Sir Wm. C. McDonald for our department of physical science, and the new University library, founded by the liberality of Mr. Peter Redpath, which is to be formally opened in October. Both of these large additions belong to the Faculty of Arts, the college proper, in which resides all our teaching in pure science and philosophy, as well as in literature; and while we, and all friends of education, rejoice in the prosperity and extension of the professional faculties, we shall still more rejoice, when it comes to the turn of the Faculty of Arts to be raised above its present penury, and to have its staff augmented, up to the needs of the time.

"It must be noticed here, that the growing specialisation of literary, philosophic, and scientific subjects, has obliged the universities of the mother country, and of the United States, to divide and subdivide these subjects in a manner unheard of in former times. In

the new University of Chicago, endowed by one of the millionaires of that city, I find the subjects covered by our Logan Chair of Geology, divided into nine, each represented by a separate man, and some of these men, amongst the best in America in their several specialties. Other chairs are treated in like manner. We, in McGill, are far at present from such subdivision. But, when we think of this, we cannot fail to be astonished at the good work done by our small staff, each member of it, burdened with work which might well be divided amongst several chairs, and in some cases very imperfectly supplied with means and appliances. Viewing the matter in this way, and in connection with the small economies we have been obliged to practise, the friends of education should hold our working men, in the Faculty of Arts, in no small respect and esteem. In my absence these matters have occupied much of my thought.

"Referring to the report for the past session as presented by the vice-principal, the fact that we have had more than a thousand students actually attending lectures, that the Faculty of Arts has had 347 students, and that at this and the previous meetings of

convocation, we have conferred 135 degrees, (forty-two of them in Arts), constitutes a proud record for a Canadian university. I note, with especial pleasure in this regard, the success of our efforts for the higher education of women, as evidenced by the large number of students and graduates, and by the high standing they have attained.

"In the annual report, the vice-principal has ably treated the seeming paradox, that McGill, while receiving so great benefactions, continues to be so poor. The work established by the old Board of Governors, consisted mainly of the primary essentials of a liberal education, and to these the McGill endowment and subsequent benefactions, up to recent years, were devoted. The later benefactions have been largely for the establishment of new work, or for the extension of special departments. Hence, the older and more general work, always slenderly endowed, has remained unaided, and has even had larger demands made on it by each succeeding benefaction.

"Thus, some departments are practically impoverished, and greater stress of work laid on them, while others are enriched. It would seem that 'the heavy end of the log,'

as well as the shorter levers, belong at present to the older and purely academical branches. We have, however, been accustomed to this in McGill, and, like the schoolboy, out at elbows, have not been concerned, knowing that the sight of the bare skin would be sure to produce either a patch or a new coat. There has always been, on the part of our governors and benefactors, that good generalship, which can see that one part of our educational army cannot be unduly advanced, or another allowed to be beaten back, without danger of defeat, and we may be sure that a similar policy will prevail in the future. To the graduates of to-day, I may say, we have full confidence that you will sustain the honour of the University, and will regard the education you have received as a sacred trust, of which you are the stewards, and which is to be used for the good of all, for the advancements of your country, and for the glory of God."

Although restored in general health, on my return to Montreal it was very evident to me, that I had not recovered my former vigour, and, acting on the urgent advice of my medical attendants, I therefore decided

to place my resignation in the hands of the Board of Governors, and accordingly submitted to them the following letter on the 26th of May, 1893:—

"To the Board of Royal Institution, Governors of McGill College:—

"Gentlemen,—It has become my painful duty to-day to tender to you my resignation of the offices of Principal, and Professor of Geology and Natural History, which I have held for so many years;—this resignation to take effect at the end of the present educational year in July, or at any earlier date that may be convenient to the Board.

"Referring to my letter of March last to the Chancellor, I have, since that time, used every means in my power towards the restoration of my health, and have consulted my medical advisers, to whom, (and especially to Drs. Craik, Stewart, and Blackader), I am under the deepest obligation, for their unremitting care and kindness. The result is,—and this coincides with my own impression,—that, at my advanced age, and in consideration of the symptoms still remaining as consequences of my recent illness, I cannot hope for such restoration of health as would

render it safe for myself, or expedient in the interests of the University, that I should resume my official work.

"I beg to assure the Board that I have arrived at this conclusion with extreme regret, and am resigned to it only in the belief that it is the will of God, and that it will tend to the best interests of the University in the future. Even in the most favourable circumstances, I could only hope to hold the reins of government for a short time, and but feebly, while the present enlarged and advancing condition of our affairs requires a strong and firm hand, and watchful guidance.

"I need not say, that I shall have much pleasure in doing anything in my power, to strengthen the hands of my successor, and to promote the interests of the University in an unofficial way. I shall also be glad to retain some connection with the University as Emeritus Principal and Professor, and, if desired by the Board, as a Governors' fellow. In these relations, I shall at all times be at the service of the Board, for any aid which it may be in my power to render, without interference with the rights or duties of others.

"I am, however, very desirous of devoting as much as possible of my remaining time and

strength to the preparation, arrangement, and description of the collections which I have placed in the Peter Redpath Museum, with a view to increasing their scientific and educational value, and of completing my own life-work in Canadian geology. I have been prevented hitherto from attaining these ends by the pressure of other duties. For this reason, I desire to retain the position of an honorary curator,—stipulated for when I presented my collections,—and to have the temporary use of a room in the museum for the prosecution of the work.

"Since my return, I have, with the aid of the vice-principal and the acting-secretary, been endeavouring to finish what remains of the work of last session, and to make preparation for that of the next. This I hope will be completed before the June meeting of the Board, and in the meantime I would ask the Board to authorise one of its members to act in regard to what remains to be done, as to vacating my office, and college residence.

"I have further, to tender to the members of the Board my most sincere thanks for the interest which they have ever manifested in my work, and for their kindness to myself and to Lady Dawson,—more especially in my

recent illness; also to the vice-principal, and to the deans and professors of the several faculties, for the readiness and efficiency with which they have discharged extra duties imposed on them by my absence.

"In conclusion, while profoundly grateful for the measure of success which has attended my administration of the affairs of the University, and especially for the absence of those disorders which have marred the success of so many colleges, I would not wish that my educational views and aspirations should be measured by our present attainments. The ultimate objects to be secured, by combining all the elements of success present in our time and country, have been steadily kept in view from the first, and have been presented in many forms to our friends and to the public. Much has been attained, but much still remains to be accomplished, especially with reference to the purely educational or academical faculty, which, in the present stage of Canadian society, demands more than any other, generous support. Means for this have hitherto been deficient, and much precious time and energy have been wasted in the inevitable struggle to maintain the ground already gained. It has been my earnest prayer, that

I might be permitted to carry out in the case of McGill, my ideal of a complete and symmetrical university suited to this country, and particularly to the English population of this province. It has pleased God to deny me this satisfaction; but I entertain the firm belief that good foundations have been laid, which will not be disturbed, but will be built on and carried to full completion, by the energy, care, and judgment of my immediate successors. I remain, Your obedient servant,

"J. WILLIAM DAWSON."

Having thus brought to a close my official connection with the University, my wife and I repaired to our cottage at Little Métis for the summer, and prepared later to take up our abode, in a small house on University Street, within easy reach of the college museum and library,—since I still hoped to spend some years in the study of God's wondrous works, as well as of His Word.

The spring of 1896 recalled my wife and myself to England, to be present at the marriage of our youngest son, Rankine, to Miss Gloranna M. Coats, which took place in June, in St. Michael's Church, Chester Square, London, S.W. As I felt that this must be

my last visit to Britain, I endeavoured to make the most of it, and was present at the great conference in celebration of the Jubilee of the Evangelical Alliance, in Exeter Hall, and at Mildmay Park. In London, I attended meetings of the Royal Society, Victoria Institute, and Geological Society. I went, too, with a party of friends to the Keswick Conference for the year, from which I took a day to visit Mr. R. Kidston of Stirling, and to discuss with him some points of mutual interest, respecting Carboniferous plants, on which he is one of the best authorities. I was also persuaded to remain over for the meeting of the British Association in Liverpool, in September, at which I had an opportunity of illustrating to a large meeting of geologists the structure of *Eozoon*.

We returned to Montreal in October. I enjoyed this expedition to England, but fear that it told on my little remaining strength, and prepared the way for the partial paralysis, which attacked me in the summer and autumn of 1897, preventing me from attending the meeting of the Royal Society of Canada, held in Halifax in that year, and the meeting of the British Association in Toronto,—and which has left me, since then, an invalid,

awaiting the moment when my Heavenly Father shall call me home, and occupying the time which He may give me in this world, mainly with spiritual, rather than with worldly affairs.

CHAPTER XV

OBITUARY

It was on Sunday morning, November 19th, 1899, that Sir William Dawson completed his earthly career, passing away in the most peaceful manner, after several days of partial unconsciousness. On the day following, a special meeting was convened at the University, and attended by the Governors, the Principal, the Teaching Staff, and Students, when the following addresses were given.

Principal Peterson, after reading the Ninetieth Psalm, spoke as follows:—

"Since we met in our various class rooms last week, a great and good life has been brought to its appointed end. Sir William Dawson had considerably overpassed the span of life of which the Psalmist speaks: it was 'by reason of strength' that it was for him well-nigh fourscore years. Ever since he assumed the principalship in November 1855,—that is for a period of exactly forty-four years,—he has been the most prominent

figure connected with this University. The last six years of his life—since 1893—have been spent, it is true, in retirement from active work, but he has been with us in spirit all this time. Many of us know how closely, and with what a fatherly interest, he has followed all our later history. And now his life has closed, in great physical weakness, but happily unaccompanied by distress or suffering:

> 'Of no distemper, of no blast he died,
> But fell like autumn fruit that mellow'd long.'

"Busy, active and strenuous all his days, he must have chafed, I fancy, during recent years under a growing sense of uselessness, —almost an impatience at being laid aside from work, which had been to him so long the very breath of life; yet none ever said with more simple, child-like resignation, 'Thy way, not mine!' For such a painless passing out of life, no note of sorrow need be struck. There is no sting in a death like his; the grave is not his conqueror. Rather has death been swallowed up in victory,—the victory of a full and complete life, marked by earnest endeavour, untiring industry, continuous devotion and self-sacrifice, together with

an abiding and ever-present sense of dependence on the will of Heaven. His work was done, to quote the puritan poet's noble line, 'As ever in his great task-master's eye;' and never for a moment did he waver in his feeling of personal responsibility to a personal God. Others will speak to you of his record as a scientific man. I shall permit myself only to say, that few can have an adequate idea of the power and forcefulness revealed in the mere fact, that one who had so onerous a part to play as a college head, should have been able to keep up scientific work at all. A weaker nature would have exhausted itself in the problems of administration.

"He, himself, has left it on record, in his paper entitled, 'Thirty-eight years of McGill,' that these years were 'filled with anxieties and cares, and with continuous and almost unremitting labour.' There are on my library table at the present time, three volumes, in which three college presidents may be said to have summed up the life-work it has been given them to do, for the institutions with which they were severally connected,—Caird of Glasgow, Eliot of Harvard, and Gilman of Johns Hopkins. The first was a massive intellect which, in the security of a long-estab-

lished university system, delighted to deal, in a series of addresses to the Glasgow students, with such subjects as the unity and progressiveness of the sciences, the study of history, the study of art, and the place in human development, of Erasmus and Galileo, Bacon, Hume, and Bishop Butler. The two American presidents have lived more in the concrete, and they have put on record, their attitude to, and their methods of dealing with, the various problems they have had to face in the educational world in which their work has been done. Alongside their memorial volumes, I like to place a still more unpretending collection of 'Educational Papers,' which Sir William Dawson circulated among his friends. They mark the various stages, full of struggle and stress at every point, of his college administration, and they form a record of what he was able to accomplish,—apart from his work as a geologist,—in the sphere of education, for the High School and the Normal School of this city, for the schools of the province, and above all for McGill itself, which he found in 1855 a mere college, with eighty students, and which he raised to the level of a great university, with over a thousand.

"Not even in his well-earned retirement could he permit himself to be idle. To me, one of the most touching sights, in the first year of my arrival here, was the indomitable perseverance with which, every day, the well-known figure of the old Principal would make its way, bag in hand, across the campus to the museum he loved so well, there to work for a time, among the valuable collections which the University owes to his zeal, industry and devotion. It was in 1841, that he published his first scientific paper, and the activity which began then was continued down to the Thursday in the week before his death, when, some reference to the mining industry of this country, suggested to him that once more, with failing hand and wearied brain, he should put pen to paper on the subject of the 'Gold of Ophir.' And now he has entered into his rest,—affectionately tended to the last by the gentle care of a devoted and heroic wife, and solaced by the presence of a distinguished son, and loving daughter. The world had no power to hold him any more. His work was done, and his spirit yearned to pass beyond all earthly bounds.

"He is gone, and we shall see his living face no more. But, teachers and students alike,

may have ever with them the inspiration of his noble life, and the stimulus of his high example. What he was to those who were so long his colleagues, I leave others on this occasion to set before us: my closing words to the students of McGill must be the expression of a confident hope, that the record of Sir William's life and work, will always be an abiding memory in this place. If you will bear it about with you in your hearts, not only will you be kept from lip service, slackness, half-heartedness in your daily duties,—and from the graver faults of youth, at which his noble soul would have revolted, from dishonesty, sensuality and impurity in every form,—but you will be able, each in his sphere, to realise more fully the ideal of goodness and truth, so that at the last, you too may hear the voices whispering, as they have now spoken to him,—'Well done, thou good and faithful servant; enter thou into the joy of thy Lord.'"

Dr. Craik, Dean of the Faculty of Medicine, said,—"that since the death of Sir William Dawson, the feeling uppermost in his mind was one of deep personal loss. He was one of those who had attended the inaugural lecture of Sir William, as well as the whole of his first course of lectures on botany and

zoology. He had only graduated the year before, and it was in the following year that he was officially appointed to a position on the teaching staff of the College, so that Sir William formed a connecting link between those two important events in his life. Ever since that time, his relations with Sir William had been constant and intimate, and he had ever looked on his Principal with mingled feelings of love and reverence. At the time of his first appearance in McGill, it was hard to detect the latent powers that lay in Sir William, and it was not until he had overcome many of the difficulties that lay in his path, that it was realised that a great man was in their midst. He did for McGill what perhaps no other man could have done,—he saved its very existence. The incubus of inertia had long settled upon it so heavily, that nothing but herculean efforts, such as Sir William put forth, could have lifted it.

"Sir William Dawson accomplished as much good by his example as by his precept. He was not a man to carp and preach at those under him, or to constantly remind a man of his faults, but his example was ever one worthy of following, and his life was a living sermon. He possessed in a rare degree the

power to get the best possible work out of his assistants. Never in his life had he seen Sir William's equal as a teacher. He had such a clear and forceful way of arranging and stating his facts and knowledge, that it was impossible for any one to listen to one of his lectures without getting the best possible idea of the subject in question. He was a man of most lovable disposition, and if he had one fault it was his too tender and loving heart."

Professor Cox said :—"You have heard from some who have been his friends and fellow-workers what they have found it in them to say of Sir William Dawson; and now it is my privilege to add a few words as one who came to know him later in life.

"We are conscious, that already, six generations of students have passed through this University, to whom he was no more than a name, and we would fain use these precious moments to call up before you some vivid and personal impression of the man. But how poor are words as substitutes for the personal touch! It is easy to say that he was a scholar of distinguished—almost encyclopædic—learning; that in science he attained the very highest honours; and that he

made McGill,—nay, it would be truer to say that for thirty-eight years he was McGill. True, he found a group of benefactors, such as surely no man ever before had at his beck and call,—men who possessed not only the means, but the far-sighted public spirit to employ these for great ends, under his guidance; he had able and faithful colleagues, some of whom are with us still; and, perhaps best of all, he had many, many hundreds of students, who so far knew how to profit by his teaching and example, that they have spread the fame of McGill broadcast over the land. To the world at large, which loves always to crystallise its ideas round a man, McGill was Sir William Dawson, and Sir William Dawson was McGill.

"But, though we have been proud to remember that he was probably the greatest palæontologist this continent has produced, and have felt our hearts swell with gratitude to him as the father of McGill, it is not of this that we have been chiefly thinking since yesterday, and wish to remind you to-day. It is the gracious personality of the man. When I passed yesterday evening, and saw the flag at half-mast, drooping mournfully in the dim light, I thought of the thousands of times

the familiar figure had entered through the portals below. There is not a corner of this building that fancy does not associate with that figure, from this hall, where he has conducted so many public ceremonies of the University, to the east wing, where, in the old days, the cheerful lights at night used to assure us that the head and heart of McGill was busily at work.

"His personality impressed strangers at first sight. Quite lately, the deep sympathy he always felt for the weak and the oppressed, led him to take a characteristically keen interest in the poor Doukhobors; and when a venerable member of the Society of Friends, who had made many journeys on their behalf, paid me a visit, I begged him to call on Sir William, and give him an account of them. He came back presently to thank me, with his face strangely illumined, and said, 'I have seen William Dawson, and we have been very near the gates of heaven.'

"The first thing to strike a newcomer, was a courtesy, so marked that you might call it courtliness. It was so real, because it was based on such genuine consideration for all. You might see him explaining some simple matter to a child, or go to him with some

trivial difficulty, and you felt sure that his great powers were as freely at your service, as if he were presiding at the councils of the University, and shaping its policy. What dignity he lent to our public ceremonies! The peculiar gesture with which he 'capped' the graduating class at the granting of degrees, has often struck me as conveying at one motion, a patent of knight-errantry and a benediction.

"Next, you felt the native power of the man. I have never met a finer instance of the mailed hand in the velvet glove. He had all the qualities of the great statesman; breadth of view, combined with grasp of detail; foresight, that makes the record of his life read like the written fulfilment of the plans of his youth; insight, that led him straight to the kernel of any difficulty; swift decision to deal with emergencies great and small as they arose; patience and tireless industry, and method, that enabled him to make the most of his work. He was a born ruler, a born teacher, a born investigator. Any one of these gifts is exceptional; the combination of two of them is unusual; but to find all three united in one man is rare indeed. And withal there was refinement and distinc-

tion,—the keen edge of the finely-tempered steel.

"But, after all, to use Walt Whitman's rugged phrase, 'That which enables a man to stand with aplomb before his fellow-men is character.'

"The pre-eminent note of Sir William's character was, to my mind, his singleness of purpose, his simplicity. How incredibly far-off all meanness and baseness seemed from him. You might disagree with him, or think him masterful, but, as well grasp the poles and draw them together, as try to associate pettiness or self-seeking with him. In the pursuit of objects he thought worthy, he disdained no task, however trivial,—spared no sacrifice. And was there really anything in which Sir William was not interested? He seemed to catch the full zest of life as it passed, and let nothing find him blunted or dull, or weary. In Pater's beautiful words:—'To burn always with this hard, gem-like flame, to maintain this ecstasy, is success in life.'

"In one word, he was fit to be the example of the thousands of young men who frequent a university. That is a word of solemn import, to us who are set in posts of authority,

to be your guides, and to you, on whom is laid the responsibility of choosing the best that is in us to give you, and rejecting all wherein we fail.

"We are met to celebrate, with proud grief, if you will, the safe conclusion of a noble and glorious life, which has now been sealed with the everlasting sleep. Hereafter nothing can harm it, nor any tarnish come near it. He, who for eighty years so strenuously maintained its lofty tenor, has inherited rest. But in this university, the memory of it will be our sacred and inviolable possession. There will doubtless be outward memorials, but better even than these splendid piles of dead stone about us, will be the living witnesses, who have drunk of his spirit, and illustrate it in their own lives. In a world of poor ideals, ambitions taken up at random and followed unstably, the value of one such concrete instance of a life, well planned and well lived, devoted to high ends, is beyond price. When the loss of such a leader, shakes us for a moment out of the dull routine of habit, we do well to pause and consider, 'Have we chosen well?' We think perhaps of great fortune and the statesman's power, and these are good so far as they bring opportunity for service; of

literary fame or scientific renown,—who shall decry them in these halls?—of a profession faithfully and successfully followed—there is no better life-work for most of us.

"But, when the end comes, shall we be satisfied? Listen to his own words, in the farewell University Lecture:—'My life at McGill has been fraught with the happiness which results from conscious effort in a worthy cause.'

"I say again, that Sir William Dawson was fit to be an example set before the young men of a university. But if I stopped there, knowing the devout faith by which he lived, he would rightly hold me guilty of treason to all that he held most dear. Many of us in this room could not see eye to eye with him on matters of dogma, but this we know, that the example on which he modelled his life is the highest and best that has been vouchsafed to men; and if he attained excellence worthy of our imitation, it was because, first and last, he sought to make his life a type of Christ."

From amongst the numerous obituary notices which appeared in scientific and educational journals, as well as in the daily press, a few extracts have been selected, and will be reproduced here, as being typical

of the sentiments expressed by many writers, in many places and ways :—

The *Times* of November 20, 1899, contains the following :—

"Sir William Dawson was a presbyterian of the old school, and strongly opposed to all theories of the evolution of man from brute ancestors, nor would he allow anything more than a very moderate antiquity for the species. He held that there is no adequate reason for attributing the so-called 'Neolithic' man to any time older than that of the early eastern empires, or say, 2000 or 3000 B.C., while he thought the time required for a Palæolithic man, need not be more than twenty or thirty centuries in addition, man having thus made an abrupt appearance in full perfection, not more than six or eight thousand years ago. The study of geology, too, he would have emancipated from the control of 'bald metaphysical conceptions,' and above all, delivered from that materialistic infidelity which, by robbing nature of the spiritual element, and of its presiding divinity, makes science dry, barren, and repulsive, diminishes its educational value, and even renders it less efficient for the purposes of practical research.

"In his geological work, he was always interested more in the history of life than in mere rocks and minerals, and would probably, for that reason, have considered his most important contribution to scientific knowledge to be the discovery of a form of organic life in the Laurentian rocks. His conclusions, however, were not universally accepted, and the controversy respecting *Eozoon Canadense*, as he named the organism which he described in 1865, can scarcely be regarded as completely closed even now.

"Personally, Sir William Dawson was a man of much quiet geniality, gentle, even deferential in manner, but decided in opinion and firm in action."

In the *Educational Review for the Atlantic Provinces of Canada*, (December 1899), Dr. A. H. Mackay says:—

"In no part of Canada has the career of Sir William Dawson been more closely followed than in the provinces by the sea, for he was born here, he was inspired with the spirit of scientific research here, and his earliest educational and scientific efforts were made here; nor did he forget us when he left us for a wider field of labour. His life will continue to be an inspiration to many,

as the tide of years flows on, but this skeleton sketch cannot be expected to reveal its spiritual influence. The hand of the skilful biographer will, no doubt, soon give us a glimpse of the living, active and conquering man, showing what has been done by one man in the past, and what therefore can be done by men in the future. . . .

"As an evolutionist, Sir William Dawson did not go to the extreme doctrines of most scientific men of the present day. He believed in the geological evolution of the earth from a primitive created condition, and his exposition of the evolution described in the first chapter of Genesis, is a very interesting feature of his book 'The Origin of the World.' He believed, also, in the evolution of varietal forms in animal and vegetable life, but he did not believe in the spontaneous evolution of nothing into atoms and force, nor in the evolution of dead matter into living forms. He says, under the heading, 'True Evolutions and False,' that, 'the term evolution need not in itself be a bugbear on theological grounds. The Bible writers would, I presume, have had no objection to it if understood to mean the development of the plans of the Creator in nature.' While

theological writers rightly refer to him as the great champion of the Bible against infidel scientists, they create a very wrong impression, if they imply that he maintained the prevalent notions of the orthodox theologians of the beginning of the century."

In the *Canada Educational Monthly*, for January 1900, Professor C. W. Colby, M.A., concludes thus :—

"A sketch of Sir William Dawson, which deals only with the leading facts and results of his life, must necessarily seem rather barren, for he had strong characteristics. Much might be written about his personal traits, and the skill with which he transacted business. He had tact in combination with a firm grasp of affairs, and his courage in facing difficulties would have well befitted a statesman. He had the constructive instinct, and his brain teemed with projects for the promotion of the aims which he had at heart. Yet, where no principle seemed at stake, he would willingly go half-way in bridging over objections and differences. Perhaps, his most striking quality was seriousness and depth of conviction. Religious thoughts and utterances formed part of his daily life, and his example has been quoted as an illustration from

many a pulpit. No one ever retired from the absorbing occupation of an active life with more dignity, or more resignation. In his farewell words to McGill he said:—'My connection with this university has been filled with anxieties, and almost unremitting labour.' Still nothing but failing health could have driven him from his post. Those, who for years, watched his strenuous and honourable career must have found satisfaction in the circumstances of its close. They could have wished for him no greater reward, than the peace of mind and the happy surroundings which were his to the last."

Professor Frank D. Adams, who contributed notices to the *American Journal of Science*, to *Science*, and to the *Journal of Geology*, says in the last-named journal:—

"Sir William had a courteous, or rather a courtly, manner, based on a genuine consideration for all. He was respected and beloved by all who knew him, and especially endeared himself to all who studied under him. The pre-eminent note of his character was simplicity, and singleness of purpose. His loss will be felt, especially in the institution with which he was long connected, but his name has been perpetuated in con-

nection with the geological department of the University by the establishment of a second chair in geology, to be known as the Dawson Chair, which has just been endowed by Sir William Macdonald,"

Principal MacVicar, D.D., LL.D., writing in *The* (Canadian) *Westminster*, says:—

"Sir William Dawson's name will always hold a foremost place in any fairly written history of educational and Christian work in Canada. Having for nearly forty years enjoyed the privilege of his friendship, it is to me a pleasure to trace some features of his career, and noble character, which more than justify this claim. . . . He was a man of singular versatility and diligence. Those who met him daily, know with what ease and readiness he could turn his mind to almost any subject. It was this power, combined with watchfulness to redeem the time, to fill up every passing moment with useful activity, in a word his genuine love of work, that made his knowledge almost encyclopædic. . . .

"He was a fervent believer in Christian missions. For many years his Bible class on Sunday afternoons, in the Y.M.C.A. Hall, was attended by hundreds of old and young.

"There was no religious or philanthropic

cause in favour of which his voice was not heard, and no platform of an evangelical kind on which he was not heartily welcome. As president of the Evangelical Alliance, and of the Bible Society in Montreal, he did more than can be told to extend the blessings of Christianity."

"*Blessed are the dead which die in the Lord, from henceforth: Yea, saith the Spirit, that they may rest from their labours; and their works do follow them.*"—Rev. xiv. 13.

DEGREES, TITLES, MEMBERSHIPS, ETC.

M.A. (Edin.), 1856; LL.D. (Edin.), 1884.
LL.D. (McGill), 1857.
D.C.L. (Bishop's College), 1881.
Superintendent of Education, Nova Scotia, 1850.
Fellow, Geological Society of London, 1854.
Principal, McGill University, 1855.
Fellow, Royal Society, London, 1862.
Lyell Medal of Geological Society, 1881.
First President, Royal Society of Canada, 1882.
Created C.M.G., 1882.
President, American Association, 1882–83.
Created Knight Bachelor, 1884.
President, British Association, 1886.
President, Geological Society of America, 1893.
Hon. President, Natural History Society of Montreal.
Vice-President, British and Foreign Bible Society.
President, Montreal Auxiliary Bible Society.
Fellow, Academy of Arts and Sciences, Boston.
Fellow, American Philosophical Society, Philadelphia.
Fellow, Geological Society of America.
Associate, Académie Internationale de Géographie Botanique.
Hon. Fellow, Edinburgh Geological Society.

Hon. Member, Natural History Society, New Brunswick.
Hon. Member, Literary and Philosophical Society, Manchester.
Hon. Member, Maryland Academy.
Hon. Member, New York Academy of Science.
Hon. Member, Philosophical Society, Princeton.
Hon. Member, Philosophical Society, Leeds.
Hon. Member, Boston Society of Natural History.
Hon. Member, Geographical Society of Australia.
Hon. Member, Nova Scotia Society of Mining Engineers.
Hon. Member, Canadian Society of Civil Engineers.
Hon. Member, Geological Association, Liverpool.
Hon. Member, Essez Institute, Salem.
Hon. Member, Société Belge de Géologie, Palæontologie, &c.
Hon. Member, Brooklyn Institute.
Hon. Member, North-Western Historical and Literary Society, Iowa.
Cor. Member, Academy of Natural Science, Philadelphia.
Cor. Member, Portland Society of Natural History.
Cor. Member, Nova Scotia Institute.
Cor. Member, Geological Society, Manchester.
Cor. Member, Lyceum Natural History, New York.

&c. &c.

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